Pit and Quarry

With which is consolidated CEMENT-MILL & QUARRY

Member Audit Bureau of Circulations

Read in Largest Number of Plants

Vol. XXI | December 31, 1930 | No. 7

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Vol. XXI CHICAGO, DECEMBER 31, 1930 No. 7

Road Builders Ready for 1931 Convention

PLAN VARIOUS GROUP MEETINGS

The four days of the 28th annual convention and show of the American Road Builders Assn. will be replete with addresses and discussions, of prime value to every person who is involved in the construction of highways or in the production of road-building materials. The convention will start Monday, Jan. 12 and will continue through Thursday, Jan. 15. The sessions are arranged to consider various general groups as follows:

Monday morning—General.

Monday afternoon—County highway officials. Highway finance and administration. Traffic devices, steel forms and weighing devices.

Tuesday morning—Highway location. Airport drainage and surfacing. Motor freight. Contractors.

Tuesday afternoon—City officials. County highway officials. Construction and maintenance methods for low-cost roads and bridges. Contractors.

Wednesday morning—Subgrades and pavement bases. Snow removal and equipment. Grading methods and equipment. Standardization of methods in purchasing equipment.

Wednesday afternoon—Maintenance equipment. Grade crossings. Highway officials. City officials.

Thursday morning—Pan-American. Central- and truck-mixed concrete. Highway guard-rails.

Thursday afternoon—County highway officials. City officials.

Luncheons and special committee meetings are scheduled daily. A smoker will be held Monday evening, and a supper-dance Tuesday evening. The business session of the association will occur at 4:30 Thursday. The international reception and ball will conclude the affair Thursday evening.

To Build $700,000 Plant on Land Worth $500,000

O'Brien Bros. Sand & Gravel Corp. of New York, N. Y., producers on Long Island, are reported to have acquired the 100-acre summer estate of Mrs. Phillip Curran near Port Jefferson, L. I., and will erect one of the most modern sand-and-gravel plants in the country there. The price paid for the acreage was said to be $500,000, or $5,000 per acre, while the expenditure for the plant will be approximately $700,000, according to reports.

The new plant, combined with the other holdings of the O'Briens, will make the company the largest sand-and-gravel producers in the United States, it is said.

Arrange Transit-Mixed Concrete Assn. Program

The National Association of Paris Transit-Mixed Concrete Manufacturers will hold its annual convention at the Marquette Hotel, St. Louis, Mo., January 9-10-11-12, the Friday, Saturday, Sunday and Monday preceding the annual Road Show in the same city.

Representatives of the National Sand and Gravel Assn. and of the Portland Cement Assn. will address the association, which is composed of fifty operators of Paris transit mixed equipment in the United States and Canada. Transit Mixers, Inc., equipment manufacturers will be represented by its president, A. Knowles, and Hugh P. Paris, inventor of the Paris transit mixer will also appear on the program. Development of this new industry during the past year and the most modern methods of manufacturing and delivering transit-mixed concrete will be demonstrated by moving pictures.

The association has executive offices at Portland, Oregon. E. A. Landis is executive secretary, and Porter W. Yett, Portland operator, is president.

Oyster-Shell Plant at Biloxi Will Be Rebuilt

The Biloxi Grit Co., Biloxi, Miss., plans the erection of a two-story oyster-shell crushing plant to replace the plant recently destroyed by fire. The installation will include electrically-operated equipment, screens and transmission equipment, to cost approximately $40,000.

Will Supply Gravel for Two Federal Structures

Wilder & Montfort, sand-and-gravel producers at Blaine, Wash., will supply 3,000 cu. yd. of gravel for the construction of two government buildings at that place.

Improves Long Island Sand-Dredging Plant

TO INCREASE STORAGE CAPACITY

The East Meadow Sand-Gravel Co., East Hempstead, L. I., N. Y., in July, 1930 put into operation a new sand-and-gravel dredging and screening plant with a capacity of 600 cu. yd. per day. The dredge has a 10-in. Worthington centrifugal pump which is driven by a standard 6-cyl. 150-hp. oil engine. The plant equipment was furnished by the Smith Eng. Co. and consisted of a Telsmith revolving screen and five 7-ft. and five 8-ft. sand settling tanks. Material is recovered from the bins through Telsmith gates in a concrete tunnel. The trade is purely local with truck deliveries.

A number of improvements will be made during the winter. A system of conveyors will be installed to increase the storage capacity about 10,000 cu. yd. Batching equipment for truck loading will also be installed. Officers of the company are: Mike Charles, president; Martin Charles, treasurer; Thomas Charles, general superintendent.

Employees Banqueted as Plant Ends Year's Work

The regular fall banquet of the Michigan Limestone & Chemical Co., Rogers City, Mich., which annually marks the close of a successful season at the plant, was held Saturday, December 13, in the high school auditorium at Rogers City.

The several hundred employees and guests enjoyed a varied program. Robert Parker Miles, one of America's most popular lecturers, was a headliner on the program.

Incorporate to Develop Island Gravel Deposits

The Hat Island Sand & Gravel Co. has been formed to develop deposits on Gedney Island, near Everett, Wash. and plans are being pushed for the construction of a $50,000 plant on the site.

Incorporators of the new concern are L. B. Steadman and Victor Elfendahl, both of Seattle.

Decline in Building Is Less Pronounced

NOVEMBER PERMITS $131,871,594

Although the falling-off in proposed building and construction activities which was noted throughout the United States during October continued through the month of November, the declines were less pronounced than during the preceding month, according to official reports of building permits issued in 587 leading cities and towns and tabulated by S. W. Straus & Co.

Building permits totalling $131,871,594 were issued during November, compared with a total of $150,751,374 in October. This represents a loss of 12 per cent. In normal years a decline of about 8.9 per cent may be expected. October had shown a loss of 10 per cent from September contrasted with a normal expectancy of a 5-per cent increase.

During November, 1929, permits issued were $194,289,502. November, 1930, thus showed a loss of 32 per cent from the same month of the previous year. October, 1930, had declined 40 per cent from October, 1929.

The twenty-five cities reporting the largest volume of building permits for November showed an increase of 8 per cent above October. As a group, the twenty-five cities declined 22 per cent from November, 1929, and 40 per cent from the same month in 1928.

Thirteen of the cities showed individual gains over October. New York filed plans amounting to $41,667,765 during November compared with $26,406,153 in October. The other twelve cities showing gains were Seattle, Newark, Baltimore, Springfield, Mass., Cambridge, Mass., Dearborn, Mich., Pittsburgh, Portland, Ore., St. Louis, Syracuse, Dallas, and Davenport, Ia.

Fourteen cities, Seattle, Cleveland, Springfield, Mass., Cincinnati, Cambridge, Mass., Washington, D. C., Dearborn, Mich., Oklahoma City, Houston, Boston, Portland, Ore., Syracuse, Dallas, and Davenport, Ia., went ahead of November, 1929. Seattle, Springfield, Mass., Cambridge, Mass., Dearborn, Mich., Oklahoma City, Pittsburgh, Portland, Ore., Syracuse, Dallas, and Davenport, Ia., showed gains over November, 1928.

The Straus index of building permits was 38.0 for November as compared with 45.2 for October and 56.0 for November, 1929. The index has thus reached the lowest point of any month this year. The index, after adjustments for seasonal variation, is still 16.8 per cent below the general trend, which has been persistently downward since the middle of 1926.

The Department of Commerce reports that 3,400,000 workers are unemployed. In order to ameliorate the unemployment situation in the building trades, local unions are proposing the stagger system, a shorter week, and a shorter day so as to obtain work for each member if only for two or three days a week.

During the month of November, Portland cement prices dropped 5 cents per barrel in Boston, 25 cents in New Orleans, and 53 cents in Kansas City. Reductions were made in prices of common brick of $1.00 per 1,000 in Boston, and $1.50 per 1,000 in Cincinnati while a price increase of $1.00 per 1,000 was made in Dallas. Structural-steel shapes increased 15 cents per 100 pounds in Dallas. Price increases in long-leaf yellow pine delivered in Manhattan are due to an announcement of a rise in intercoastal steamship freight rates to take effect in January, 1931.

Receives Contract for 11 Miles of State Road

The Hersey Gravel Co. of Hersey, Mich., has been awarded the contract for furnishing materials as well as constructing eleven miles of state highway in Van Buren County, Mich. The company recently completed two other contracts in that vicinity.

Deed 178 Years Old Cited in Sand Suit

NEW YORK ISLAND INVOLVED

An ancient deed of land, dated 1752, will be the point on which a corporation's right to excavate sand and gravel in Long Island Sound nearly 180 years later is to be decided. Supreme Court Justice Druhan at Brooklyn, N. Y. recently issued a temporary injunction restraining the O'Brien Brothers Sand & Gravel Corp. from excavating gravel on Barrel Island in Port Jefferson harbor until the suit of the Great Eastern Gravel Corp. to permanently restrain them comes to trial.

The Great Eastern corporation claims it has a contract made in 1929 with the trustees of the town of Brookhaven, L. I., alleged owners of the island, giving it the exclusive right to excavate sand and gravel there. The old deed, which is said to give the trustees of the town the right to make such a contract, will be the most important piece of evidence in the trial.

The O'Brien corporation claims the trustees have no right to make such a contract because the deed of 1752 does not include Barrel Island. It claims to have as much right to excavate sand and gravel from the island as the Great Eastern concern.

Warner Co. Appropriates $900,000 for Expansion

Warner Co. of Philadelphia has appropriated approximately $900,000 for new plant construction and expansion. Additional retail terminals for distribution of concrete will be established and facilities of terminals now in operation will be enlarged.

Expansion in this department of the company's business is necessary to meet the steadily increasing demand for delivery of centrally mixed concrete.

BUILDING AND ALTERATION PERMITS FOR NOVEMBER, 1930, COMPARED WITH NOVEMBER, 1929, AND OCTOBER, 1930

State	Nov., 1930	Nov., 1929	Oct., 1930	State	Nov., 1930	Nov., 1929	Oct., 1930
Alabama	$ 250,663	$ 574,489	$ 323,369	Nevada	$ 72,350	$ 139,025	$ 89,585
Arizona	248,207	232,968	207,939	New Hampshire	41,758	43,786	90,674
Arkansas	84,645	325,591	140,193	New Jersey	5,660,327	7,904,626	5,052,233
California	10,545,583	17,190,073	15,789,901	New Mexico	98,285	109,492	80,830
Colorado	463,743	862,263	711,871	New York	48,683,399	55,979,914	37,186,050
Connecticut	2,344,378	5,338,547	3,105,783	North Carolina	498,926	1,519,346	407,167
Delaware	198,165	196,549	245,040	North Dakota	281,352	180,495	118,184
District of Columbia	1,477,220	1,040,320	2,191,665	Ohio	6,839,252	12,186,877	14,204,480
Florida	849,241	1,588,575	1,334,895	Oklahoma	1,984,724	3,418,515	3,320,251
Georgia	385,947	607,220	1,319,949	Oregon	1,168,513	1,089,413	822,959
Idaho	81,452	88,257	142,271	Pennsylvania	5,552,059	13,376,147	8,085,407
Illinois	6,187,300	21,336,629	10,559,405	Rhode Island	609,520	1,531,380	953,360
Indiana	1,435,679	2,735,101	1,631,285	South Carolina	409,891	323,377	300,872
Iowa	1,617,755	865,907	1,185,226	South Dakota	130,230	134,450	193,275
Kansas	411,961	991,517	1,728,769	Tennessee	687,870	917,842	1,098,671
Kentucky	277,865	904,470	1,322,715	Texas	3,914,909	5,623,896	5,018,587
Louisiana	784,863	677,000	909,947	Utah	176,300	355,025	263,057
Maine	494,639	158,335	117,919	Vermont	7,000	13,000	11,000
Maryland	2,028,436	2,319,175	2,065,014	Virginia	1,439,461	691,400	1,281,252
Massachusetts	7,862,664	4,155,339	7,263,258	Washington	3,758,815	2,296,048	2,764,814
Michigan	5,013,071	9,702,653	5,823,969	West Virginia	485,553	736,143	930,047
Minnesota	1,216,414	2,294,291	1,796,257	Wisconsin	3,095,922	6,351,058	4,630,327
Mississippi	12,509	43,568	24,910	Wyoming	19,294	12,460	22,172
Missouri	1,502,471	4,594,616	3,301,449				
Montana	269,580	87,674	62,269	Totals	$131,871,594	$194,289,502	$150,751,374
Nebraska	211,433	444,660	520,852				

Arrange Program for Crushed-Stone Assn.

CONVENTION OPENS JANUARY 19

The following program for the fourteenth annual convention has been formulated, after months of consideration and arduous work, by the officers of the National Crushed Stone Assn. Notwithstanding these efforts, the program is offered subject to alterations. As will be observed it is sufficiently diversified in the subjects of discussion to interest everyone who has any business contact with the crushed-stone industry. During the three and one-half days of the convention many important problems that affect the welfare of the industry will be presented and discussed by authorities in their respective lines.

MONDAY, JANUARY 19

Morning Session

W. F. Wise, president, presiding

10:00—Address of welcome—Hon. Victor J. Miller, mayor of St. Louis.

10:15—Response for the association—W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill.

10:25—Presidential address—W. F. Wise.

10:40—Reports of directors on business conditions in 1930 and outlook for 1931.

12:00—Appointment of convention committees.

12:20—Report of committee on finance—A. L. Worthen, chairman.

1:00 P. M.—Greeting luncheon—Everyone, including active and associate members, as well as guests, is cordially invited to attend.

Col. O. P. Chamberlain, president, Dolese & Shepard Co., presiding.

Afternoon Session

Arthur S. Lane, John S. Lane & Son, Inc., Meriden, Conn., presiding

2:30—Report of membership committee—J. R. Boyd, chairman.

2:40—Some legal aspects of proration—Harold Williams, attorney-at-law, Boston.

3:10—The economic features of the bituminus type of road—B. E. Gray, highway engineer, The Asphalt Institute.

3:30—Discussion—C. L. McKesson, director of engineering and research, American Bitumuls Co.

3:40—Discussion—George E. Martin, consulting engineer, The Barrett Co., New York, N. Y.

3:50—Taxation and Transportation—Dr. Wm. B. Guitteau, formerly executive secretary, Ohio Crushed Stone Assn.

4:15—Report of committee on standards—F. S. Jones, chairman.

Sub-committee for the standardization of commercial sizes of crushed stone—A. T. Goldbeck, chairman.

Sub-committee for the standardization of drilling equipment—W. W. Duff, chairman.

Sub-committee for the standardization of specifications and the marking of supplies and equipment—John Rice, Jr., chairman.

Monday Evening

7:30—Formal opening of manufacturers' division, exposition of quarry equipment, machinery and supplies—Mezzanine Floor, Hotel Jefferson.

TUESDAY, JANUARY 20

Morning Session

A. L. Worthen, Connecticut Quarries Co., Inc., New Haven, Conn., presiding

10:00—The applicability of various methods for sewage disposal—S. W. Freese, Hawley, Freese and Nichols, Fort Worth, Tex.

10:15—Discussion—Led by Prof. Harry N. Lendall, head of civil engineering dept., Rutgers University, New Brunswick, N. J.

10:25—Rates and rate making—Edwin C. Brooker, commerce counsel, Washington, D. C.

10:50—Report of the committee on interpretation of trade practice rules—O. M. Graves, chairman.

11:05—What is the construction outlook?—Thomas S. Holden, vice-president, F. W. Dodge Corp., New York, N. Y.

(Continued on Page 146)

Seattle Sand Producer to Merchandise Steels

At a cost in excess of $30,000 the Pioneer Sand & Gravel Co. of Seattle, Wash., has started work on a reinforcing-steel-bar plant building in Seattle. The company is broadening its service to contractors and will hereafter represent the United States Steel Corp. in the state of Washington in the distribution of reinforcing bars. A stock of 3,000 tons of bar steel will be carried and modern bending machinery will be installed in the new plant to handle the reinforcing-steel orders.

The structure will be steel frame and 162 ft. by 72 ft. in area. Concrete floors are specified. The sides will be of corrugated iron and electric hoists operating on monorails will be employed in handling the steel.

The new plant is expected to be in operation late in January.

Louisiana to Build Ten Huge Bridges Next Year

Ten major free bridges, all of which will be under construction by July 31, 1931, are being planned under Louisiana's $7,000,000 bridge program by the Louisiana State Highway Commission. Plans for two of these structures—the $400,000 Moncla Bridge and the $400,000 Coushatta Bridge, both over the Red River—are about 80 per cent complete and bids are to be received January 6, 1931. It is expected that bids for the $800,000 Sterlington Bridge, for the $400,000 Harrisonburg Bridge, both over the Ouachita River, and for the $600,000 Jonesville Bridge over the Black River will be received about April 1, 1931, as all surveys have been completed for these structures and plans are about ten per cent complete.

Building Curve Reaches Bottom Point on Cycle

The current cycle of the building curve gives evidence of having about reached bottom, but the movement is likely for some time to be sidewise, with results not substantially exceeding the corresponding months of this year before the middle of 1931, Standard Statistics Co. says. The prospects are that operations will reach new peak levels before the close of 1934.

To Hold 1931 Safety Congress at Chicago

7,000 DELEGATES WILL ATTEND

Chicago has been chosen as the setting for the twentieth annual safety congress, to be held October 12 to 16, 1931, the executive committee of the National Safety Council has announced. Headquarters will be in the Stevens hotel.

The safety congress will bring together 7,000 delegates from all parts of the world. It has come in recent years to be known as a miniature "safety university" because of its large program. Nearly 400 noted speakers will talk at the 150 sessions.

Chicago also entertained the Congress in 1929 and conducted, at the same time, a "safety week" drive of vast proportions. Plans for the 1931 gathering call for a similar campaign. The 1930 congress, held in Pittsburgh the first of October this year, was one of the largest meetings in history.

Prior to the 1931 safety congress, approximately 30 regional safety conferences will be held throughout the country, according to George E. Burns of the National Safety Council. These meetings will have an average attendance of 1,000 delegates.

Indiana Quarries Await Freight-Rate Decision

A decision affecting the future of about fifty limestone quarries in the Bloomington-Bedford district of Indiana employing some 3,500 men, is expected to be made soon after Jan. 1, by the interstate commerce commission.

Operators are seeking a reduction in freight rates on dressed stone, and in the course of hearings before the commission's examiners have declared that unless a reduction is granted, they will be put out of business.

Formerly, the rate on both rough and dressed stone was the same, 30½ cents, but the commission raised the rate on the dressed variety to 38½ cents. This change, the quarry owners declare, caused rough stone to be ordered almost exclusively, it being dressed at points near where it was to be used.

Cement Co. Looks After Welfare of Employees

One of the finest plants in the country as gauged by loyalty to employees is that of the Louisville Cement Co., Louisville, Ky. This company not only maintains a complete community center but it keeps the welfare of its men and their families well to the foreground in all of its programs. Thus, in times when business is slow and there is less regular work for the men to do, the company keeps them busy with odd jobs, such as the building of cement walks or the repair of roads in neighboring territory.

Iowa Plant Destroyed by Fire Now Rebuilt

MUCH NEW EQUIPMENT IS ADDED

The plant of the River Products Co., of Iowa City, Ia., located at Coralville, Ia., which suffered a bad fire last February, destroying much of its equipment, has now been completely rebuilt, according to J. F. Sprott, general manager.

Installations during the year have included a 42-in. by 40-in. Allis-Chalmers jaw crusher, two revolving and two vibrating screens, two Type B Erie steam shovels, and two Gates crushers.

New conveyors and motors, too, are in place, together with three steel-frame storage bins with a capacity of 150 tons each. The bins are so arranged that cars may be loaded from either side and motor trucks from the center.

All trackage at the plant is standard gauge, facilitating the spotting of cars from the railroad to any position in the plant.

Three Plymouth gasoline locomotives are used about the plant and quarry and with this exception and, of course, the steam shovels in the quarry, the plant is completely electrically-driven.

The River Products Co. produces limestone in a wide range of sizes. Much of the production has gone into Iowa roads in recent years, the state having placed itself in the position of having one of the best paved systems in the country, whereas but a few years ago its mud roads were the bane of motorists everywhere.

Iowa expects to pave about 600 more miles next year and "the River Products Co. is out to get its share of this business," according to Mr. Sprott.

Census Bureau Reports Concrete Products Data

The Bureau of the Census announces that, according to a preliminary tabulation of the data collected in the Census of Manufactures taken in 1930, the total value (at f. o. b. factory prices) of concrete products shipped or delivered in 1929 by establishments in the United States engaged primarily in the manufacture of these commodities amounted to $90,610,665, a decrease of 2 per cent as compared with $92,506,987 reported for 1927, the last preceding census year.

The total for 1929 is made up as follows: building materials, $47,705,-216; conduits and pipes, $22,229,214; circular structures, $2,202,571; household and other accessories, $2,619,229; burial vaults, $3,045,166; monuments and grave markers, $80,155; paving materials, $669,275; poles and posts, $1,387,132; premixed concrete, $7,442,-241; other concrete products, $1,939,-800; concrete products not reported in detail, $1,290,666.

This industry, as defined for census purposes, embraces establishments engaged wholly or principally in the manufacture of concrete products, such as building blocks, tile, brick, cast stone, pipe, garden furniture, laundry trays, lighting standards, posts and vaults, made of sand and crushed rock, gravel, or cinders, bound together with cement. The classification does not cover concrete construction such as buildings and bridges.

Granite Manufacturers Name Mundie President

The Granite Manufacturers' Assn., of New England, at its annual meeting held at Quincy, Mass., Dec. 12, elected J. Edward Mundie, president for the coming year. Other officers elected were: Andrew Milne, vice-president; William Souden, Sr., treasurer; John Anderson, Howard Bishop and Antonio Tocci, executive committee; and Channing Deacon, Umberto Giarrusso, Angus D. Martin, Stanley H. Jenkins and Henry P. Miller, membership committee.

Universal Atlas Chorus Sings Christmas Carols

Concrete evidence of Chicago's yuletide spirit entered the heart of the financial section when the Universal Atlas Cement Co. chorus of eighty voices sang in the corridors of the building at 208 South La Salle st. on Christmas eve. The program was broadcast by the Chicago Daily News radio station, WMAQ.

Each year the chorus, which was organized in the offices of the Universal Atlas Cement Co., gives special programs of Christmas music before leading organizations. Miss Anne Protheroe, librarian of the company, and daughter of Daniel Protheroe, composer and choral director, is president of the chorus, which is directed by Harry S. Walsh, and accompanied by Mabel Egerter. Walter C. Broeniman plays the violin obligatos.

Installs Jet System to Aid River Digging

NEW HOOK-UP PROVES EFFECTIVE

The De Soto Kaw River Sand Co. of De Soto, Kan., recently installed a jet system for increasing the quantity of sand obtained from the bed of the Kansas River.

A 1,000-gal.-per-min. centrifugal pump is belt-connected to a 5-hp. motor to give 3,400 r. p. m. at the pump with a 2-in. discharge. The discharge follows the under side of the sand suction to the end of the line, the last 18 in. of pipe being reduced to permit a jet of ½ in. with a pressure of about 70 lb. "The effectiveness of this hook-up varies with the nature of the deposit and river conditions, but it has increased our volume of solids 140 per cent in hard digging and 35 per cent in normal digging," writes L. M. Chambers, of the company.

"The arrangement seems to be ideal for the small producer," Mr. Chambers continues. "We would recommend the use of a 200-gal.-per-min. pump with a 10-hp. motor to any one who plans a similar installation, however."

The company is now putting in a Wood Vortex classifier and a new series of screens to increase its variety of marketable sizes.

Ideal Cement Plants to Resume Work January 5

The Portland, Colo., and Boettcher, Colo., plants of the Ideal Cement Co., of Denver, will re-open on Jan. 5 to resume full production, according to a recent announcement by the company. That the Ideal company is ending a prosperous year is evidenced by the declaration this month of an extra dividend of 50 cents per share on its common stock in addition to the regular quarterly declaration of 75 cents.

The Universal-Atlas Cement Co. chorus.

Federal-Aid Highway Building Shows Drop

INCREASE SEEN FOR NEXT YEAR

The 48 states and Hawaii completed improvements on 9,349 miles of federal-aid highways during the fiscal year ending last June 30, according to the reports of the Bureau of Public Roads, published recently.

Another 9,915 miles of highway were in process of improvement with federal aid at the close of the year, the report shows. In all, there were 193,049 miles of main interstate and intercounty highways in the federal-aid system, on June 30, and of this total 84,012 miles had been improved with the help of federal funds.

Last year's improvement work fell below the total of preceding years, and the $75,880,863 of federal funds apportioned fell short of the 1929 sum by $6,000,000.

"The decline was anticipated," Thomas H. MacDonald, chief of the bureau, reports, "and is the natural result of the contraction of the program to a $75,000,000 basis, necessitated by the authorization of that annual sum for several years and the final absorption of the unobligated balance of funds appropriated for the earlier years."

Next year's report will show a big increase, however, it is predicted. For when Congress raised the annual appropriation for 1931 and the two following years to $125,000,000 annually and the larger sum was apportioned to the states last April the states responded by allotting $102,498,084, as compared with $70,428,896 the year before. By last August 48,000 men made up federal-aid road contractors' forces, not including the many additional men employed in the preparation and transportation of materials.

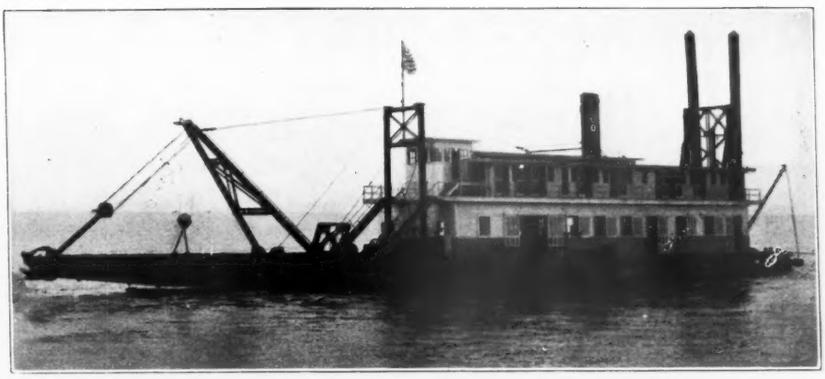
Of the 7,317 miles of road initially improved during the last year, 39 per cent carried high-type surfacings, 3 per cent intermediate types, and 58 per cent low types. Density of traffic and road types keep fairly equal pace, the report states.

"In the middle Atlantic, New England and east north central states, where the traffic is dense," the report says, "and where the number of motor vehicles per federal-aid mile are 395, 268 and 230, respectively, the percentages of high-type surfaces initially improved during the year were found to be 90, 87 and 84 per cent, respectively."

Road Builders to Hear Mixed Concrete Report

During the forthcoming annual convention in St. Louis, Mo., of the American Road Builders' Assn., complete and authoritative information about central- and truck-mixed concrete will be presented in the report of the committee for this branch of the Association. Engineers who are called upon to decide whether or not to use such concrete will receive data as to what can be accomplished by a ready-mixed method provided with modern equipment and adequate supervision. Estimates place the production of this concrete during 1930 at more than six billion cubic yards. Many engineers have failed to keep informed on this development.

R. Keith Compton, director of public works, Richmond, Va., is chairman of the committee which includes twenty-six other engineers from all parts of the country, representing cities, states, equipment manufacturers, and concrete producers.



The dredge "Tchefuncta" shortly after launching.

Sand, Gravel Machinery on Display January 26

At the request of the National Ready Mixed Concrete Assn., whose first annual convention will be held in St. Louis, Mo., at the Jefferson Hotel on January 26, the day immediately preceding the opening of the convention of the National Sand and Gravel Assn., the machinery and equipment exhibition of the sand and gravel association will be open during the meeting of the manufacturers of ready-mixed concrete who will assemble from all parts of the United States and Canada.

Asphalt Holdings Sold at Auction for $25,000

Equipment of the Miller Construction Co. of Bowling Green, Ky., on the banks of Barren river, and mining equipment at asphalt quarries in Edmonson county in Kentucky were sold at auction recently by federal court order.

The property was purchased for $25,000 by Lewis Kaye of the United Rock Asphalt Co., a concern that held a judgment of $70,000 against the Miller Construction Co. The United Rock Asphalt Co. has mineral rights for 3,000 acres of asphalt land in Edmonson county and leased its property to the Miller Construction Co. for $100,000 a year. The property sold is appraised for a value of $150,000.

New Dredge Engaged in Government Service

BUILT BY NEW ORLEANS FIRM

Jahncke Service, Inc., of New Orleans, La., producer of sand, gravel and shells, is also in the contract dredging business. This year the company completed the construction of a modern Diesel dredge, the *Tchefuncta* which has gone into service for the federal government at Bonnet Carre spillway, where its operation has been very successful, according to E. E. Crozat, a member of the Jahncke firm.

The dredge, illustrated below, was designed by the Ellicott Machine Corp. of Baltimore, Md., and was built by the Jahncke company at its own shipyards located at Madisonville, La. It is of long-leaf pine construction, is 130 ft. long, 30 ft. wide and has a depth of 11 ft. The cutter ladder is 75 ft. long and is capable of dredging to a depth of 52 ft. The two Diesel engines were supplied by I. P. Morris & De La-Vergne, Inc., of Philadelphia. The main engine has eight cylinders, 1,100 hp. and is direct connected to a 20-in. pump.

In addition to the 1,100-hp. engine, a 300-hp. Diesel is connected to a generator which supplies the electric current for the auxiliary aboard the dredge.

The dredge is capable of discharging dredged material 6,000 ft. distant.

Stockhouse Damaged by Fire Is Being Rebuilt

One of the four stockhouses in the Hagerstown, Md., plant of the North American Cement Corp., which was partially destroyed by fire recently, is already being rebuilt, according to information received from John J. Porter, general manager.

Omaha Gravel Producer Changes Office Address

The Lyman-Richey Sand & Gravel Co. of Omaha, Neb., has announced that, since Dec. 15, its offices have been located in Suite 1140, Omaha National Bank Bldg.

What About 1931 Prospects? Read What These Operators Have to Say

Majority of Those in Industry Look for Gradual Return to Prosperity Next Year

Eastern Cement Official Paints Brighter Picture

In presenting our opinion and forecast of the business outlook for 1931, as it relates to the cement industry, we do not believe that we could offer anything better than the following extracts on the subject from the report of the board of directors of the Portland Cement Assn., presented at the recent meeting of the association in Chicago:

"In the field of highway construction, we anticipate that 1931 will yield a volume of business fully as great as that of 1930.

"With respect to street paving, in which the volume was considerably lower during 1930, it seems likely that an increase can be had next year if sufficient increased effort is made.

"In the railroad field, the outlook is no less favorable than at the beginning of 1930.

"Concrete construction in connection with the development of airports is expected to continue at the present rate.

"General building will undoubtedly be considerably off during the first half of the year, but should become relatively good later in the year.

"In the dwelling-house field, there is, as yet, no tangible evidence of recovery and we expect none to become apparent until unemployment has disappeared.

"It is too early to predict the trend with respect to the use of concrete on the farm."

We might also call your attention to some of the opinions on the outlook for 1931 in New York and vicinity as given to us by a very critical observer of conditions in the building field, Allen E. Beals, whose opinions on the subject our company recently distributed in printed form under the title of "Why General Building Activity is on the Up-Grade." Mr. Beals, it should be explained, is vice-president and secretary of the Allen E. Beals Corp., 43rd St. and Lexington Ave., New York, publishers for the past fourteen years of "The Dow Service Daily Building Reports" and "The Dow Service Architects' Weekly Building Material Price Supplement," publications widely read by persons interested in building construction in the metropolitan area.

Mr. Beals believes that within the last few weeks there has been a definite turn for the better in general business activity. Some of his reasons for this belief are as follows:

ALTHOUGH some non-metallic mineral producers are rather pessimistic over prospects for the coming year, the general tone of letters received by the editor of PIT AND QUARRY from operators the country over appears quite rosy. Many companies are expressing their faith in 1931 by programs of new plant construction or remodeling. An excellent road-building year is in prospect, presaging a huge demand for sand, gravel, crushed stone and cement. General construction, too, is certain to pick up, most producers believe.

Excerpts from some of these letters appear on this and the following pages.

"Building money," he says, "is easier," offering as evidence the fact that recently, for the first time in almost a year, the New York Title & Mortgage Co. had advertised, inviting builders to come to them for mortgage loans.

"Deposits in the savings banks of New York City reached a new high total on July 1 last of $3,527,403,129, as compared to $3,347,216,195 on the first of the year, or a gain in the six months' period of $180,186,934. Practically all building money comes out of savings banks and insurance companies," Mr. Beals reminds us, and adds that "the latter have also had a remarkably good year."

"The depression," Mr. Beals thinks, "has been painted blacker than actual facts have warranted," and points out "that general building construction has been off only 49 per cent. in the New York metropolitan area, where 27.9 per cent. of all the building construction in the United States is carried on each year. The depression had less to do with this drop than the vigorous lien-law amendments of New York, the revision of the building code and the uncertainties attendant upon the activity of the city in contesting the validity of the dwelling law," according to Mr. Beal.

As further evidence that the depression is painted blacker than it really is, he points out that during the first nine months of this year stockholders actually have received more than one and one-fourth billions of dollars more in dividends (an increase of 50 per cent.) than in the corresponding period of 1929, which he claims was a boom year.

"The records of savings banks deposits for the current year tell eloquently where the bulk of that dividend money has gone—into savings banks, from whence it will ultimately flow into building investments. The Metropolitan Life Insurance Co. alone on October 9, 1930, loaned $3,321,462 in mortgages, applied to 425 dwellings and 11 apartments."

Finally, Mr. Beals states, that his company operates a free employment exchange for the benefit of employers and employees in the building business in the New York metropolitan area and that of 25 draftsmen listed on their application forms in August there were only 15 awaiting jobs in October, and also of 29 estimators looking for work in August there were only 5 in October—evidencing that architects are getting busy again.

LAWRENCE PORTLAND CEMENT CO.
New York, N. Y. Frank H. Smith, *Pres.*

City Building Program to Aid Duluth Business

There is nothing definite in sight in the way of construction work, but a serious effort is being made by the city officials to prepare a program of major improvements which will get under way during the winter and continue into the summer of 1931. This program should improve our business somewhat. The Minnesota state highway contracts for 1931 are being largely let to contractors who produce their own aggregates with temporary plants. This method works against established concerns and is robbing them of the business which they need.

DULUTH CRUSHED STONE CO.
Duluth, Minn. C. D. Brewer, *Secy.-Treas.*

Normal Weather in 1931 Will Aid Agstone Sales

It is our belief that in 1931 the volume of crushed stone produced will perhaps exceed that of 1930 although we do not think it will to any great tonnage. There undoubtedly will be just as much road building in 1931 as there has been in 1930. We believe, however, that the railroads will purchase a slightly greater tonnage of ballast.

We find that the demand for agricultural limestone was less than it would have been had the section in which it is marketed not been afflicted with the severe drought. For this reason we feel that with normal weather the 1931 demand will exceed that of 1930.

THE ERIE STONE COMPANY,
Indianapolis, Ind. E. A. Dehnbostel.

Predicts Better Demand for Highway Materials

Apparently, stone for road building will be in good demand throughout our section, probably about the same in total as in 1930.

For heavy building, we think that the demand will be as light as it was last year.

Business, however, with the larger quarries like ours, depends to a great extent on the ballast sales to the railroads. Because of the poor showing that their statements generally reveal, it does not look like much business in ballast for next year.

JOHN S. LANE & SON, INC.
Meriden, Conn. A. S. Lane, *Treas.*

Increase Anticipated in Slate Output for 1931

The outlook for 1931 as applied to our business is somewhat uncertain, but we look for a decided improvement, depending almost entirely upon the building program of the country, and also on the probable installation of electrical equipment for which we make the electrical-slate switchboards.

It appears to the writer that there is only one way in which business can go, and that is upward, and it would seem that pretty much of all the inventory on hand will be consumed by late winter or early spring.

THE PENRHYN SLATE CO.
Hydeville, Vt. Richard Griffith, *Mgr.*

California Gas Tax to Boost Aggregate Sales

Because of the generally-quiet conditions prevailing in all lines of industry, it is quite likely that the next few months will be quiet as far as general construction work is concerned. With the passing of the winter months and the advent of spring, a resumption of building activities is anticipated and, inasmuch as the state of California expects to receive between 40 and 50 million dollars from gasoline-tax revenues next year, all of which will be expended in state-highway construction, it is fair to assume the volume of gravel, crushed rock and sand tonnage offering in 1931 will probably be in excess of this year's figures.

PACIFIC COAST AGGREGATES, INC.
San Francisco, Cal. F. W. Erlin, *Vice-Pres., Gen. Mgr.*

Flag-Stone Will Boost Indiana Quarry Profit

We wish to state that, for our own district, the prospects look good for 1931. We are looking for an increase in maintenance stone, agricultural limestone, and flag-and-terrace stone. We began production on the last two items in the fall of 1930, and we anticipate a brisk demand for them in the coming year.

The outlook for new construction will be about the same as that of last year. The total increase looked for over last year is about 25 per cent.

HELLER STONE CO.
Bluffton, Ind. Walter G. Heller, *Prop.*

Expect 1931 Business to Equal 1929 Record

We expect a very decided improvement in construction business in this locality, beginning about January 1, 1931.

Improvements definitely planned, and projects under consideration in this immediate territory indicate that construction work in 1931 will be as good as it was in 1929, and it may possibly run as high as that of 1928, which was our best construction year in this vicinity.

BAKER SAND & GRAVEL CO., INC.
Tuscaloosa, Ala. G. K. Little, *Vice-Pres., Mgr.*

County Highway Program Aids Rockford Producers

We do not look for any big building program for the year of 1931.

Indications are that we will not have much paving in the city, but we expect the county will do some around Rockford.

ANDERSON SAND & GRAVEL CO.
Rockford, Ill. George R. Emanuelson, *Pres.*

New York Assn. Official Sees Good Year in 1931

Contracts for highway construction already let in our territory, southern-central New York and northeastern Pennsylvania, indicate that with a little help from commercial building, the year 1931 should show an improvement over 1930. A brisk demand during the first half of the season is reasonably assured and the demand during the second half will depend on how much construction will be speeded up in all lines to relieve the unemployment conditions. Little can be expected from grade-crossing eliminations until the eight-hour law has been tested in the Courts and, so far, commercial building has not responded to the movement to stimulate construction. We are expecting much, but banking only on what we see maturing.

EMPIRE STATE SAND & GRAVEL PRODUCERS ASSN.
Hamilton, N. Y. John G. Carpenter, *Secy.-Treas.*

Big State Road Program Aids New Jersey Plants

The year just closing has been a poor one in this district. We look forward to 1931 very hopefully and expect that it will be a decided improvement over the year 1930.

The large state program should furnish a good groundwork for producers and should also stimulate into activity other lines of endeavor.

Conditions are still below normal and I do not expect a great boom before next spring.

MENANTICO SAND AND GRAVEL CO.
Millville, N. J. Hugh Haddow, Jr., *Vice-Pres.*

Ohio Road Construction Will Boost Stone Sales

In reference to the prospects for crushed stone business for the year 1931, we feel that indications point to increased sales volume.

The road building program appears to be a very large one, and naturally, we believe that crushed limestone will receive its share of the proposed improvements.

THE CINCINNATI QUARRIES CO.
Cincinnati, Ohio. James R. Davidson, *Secy.*

Huge California Crops Assist Coast Business

We are, to a large extent, in a citrus-producing section and our prosperity is controlled to a great measure by the buying power of the general public. However, we anticipate that in a very short time the hidden money of the country will be brought out to see the light of day in the channels of trade.

The people, having had a very good example of what can happen while on a rampage of speculation will place their money in good, sound investments. Business will be on the upgrade when they forget about their stock-market losses and start in to invest again.

In the southern California section the citrus crops will be large and while they may not bring large returns to the individual grower, they are going to create more work for the laboring class than did last year's crops, and the money thus returned will be distributed to a greater number, creating better conditions as a whole.

KUSTER & WATERBURY,
Corona, Cal. F. W. Kuster, *Mgr.*

Moulding-Sand Producer Forecasts Better Year

Our 1930 business was approximately 60 per cent as great as that of 1929. We anticipate our 1931 sales to be larger because of worn-out casting replacements. We look forward to lower freight rates, enabling us to reach additional customers thereby materially increasing our sales.

JONES SAND CO.
Franklin, Pa. Geo. H. Jones, *Pres.*

Jersey Silica Producer Assails Price Cutting

Prices have been maintained in the New Jersey silica-sand industry, except by a few irresponsible jobbers who haven't a cent invested and a few

producers who do not know costs because of their poor bookkeeping systems.

The general sales volume has dropped about 30 per cent since April 30th.—*From a New Jersey silica-sand producer.*

New Plant Competition Clouds Jersey Outlook

From the present outlook, even considering the bond issue which carried at our last election, we do not think that business in 1931 will be as good as it was during 1930. At the present time very little work is under way that will carry over to next spring, whereas a year ago there was a large volume of business booked for delivery during April, May and June of 1930. Next year's business will be divided up among a greater number of producers because there are several new plants in this territory and several operators have materially increased their capacities based upon the record business of 1928 and 1929. This condition will result in a big over-production for the coming year, keener competition, and further reduction in selling prices. —*From a New Jersey producer.*

Montana Utility Program Will Benefit Business

We anticipate, in the commercial-building construction for 1931, a demand equal to that of 1930, beginning after a winter far slower than normal.

Some increase in government building will be enjoyed if prepared plans are carried through. Most of these have been ready for bids, apparently, for the last six months.

Mining requirements for lime will likely be as low as if not lower than in 1930, subject to improvement in price conditions.

Considerable development of electric power and natural gas is planned to be carried out in 1931 which will have a beneficial effect on the whole territory.

This opinion relates, however, only to our immediate territory, that of Montana.

ELLISTON LIME CO.
Helena, Mont. H. T. Kuehn, *Vice-Pres. Gen.-Mgr.*

Virginia Plant Trebled for Greenstone Output

The demand for Virginia greenstone has just begun; we are six months behind our orders. Collections are good. We expect to triple our plant this coming year, beginning immediately.

Other lines of business in this vicinity have long since struck bottom; there is no way for it to go except upward. In fact, there are many evidences of improvement already.

VIRGINIA GREENSTONE CO.
Lynchburg, Va. C. G. Loving, *Prop.*

One Producer Buoyed Up by Large Ballast Order

Judging from orders which we now have for 1931 and from authentic reports of road-and-commercial work which is to be done, we feel confident that the season of 1931 will be much better than that of 1930.

We have just received another contract from the Maine Central Railroad for 100,000 tons of ballast to be delivered during the season of 1931 with a prospect of continuing the delivery at the rate of 100,000 tons per year for the next six or eight years. Basing our opinion on the indications as noted above, we feel very hopeful about the business for the coming season.

MAINE SAND & GRAVEL CO.
Portland, Me. Geo. C. Owen, *Pres.*

Paving Job Cheers View of Minnesota Producers

Our outlook for 1931 appears to be about the same as a year ago. We look forward to quite a large volume of commercial business.

Although we have no paving job in sight for our plant here at Detroit Lakes, our plant at Ashby, Minn., has a large paving contract, which will help to offset the decrease in the volume of production at the Detroit Lakes plant.

BECKER COUNTY SAND & GRAVEL CO.
Detroit Lakes, Minn. E. A. Mullen, *Mgr.*

Calls Good Farm Year Best Business Panacea

We do not see much chance for an increase of business in 1931.

It is our belief that all wealth comes out of the ground and we realize that the farmer has had many bad years.

We do not look for improvement until the farming interests have at least one good year.

HENRY COWELL LIME & CEMENT CO.
San Francisco, Cal. W. H. George, *Secy.*

California Silica Plant Enlarges for 1931 Sales

The Crystal Silica Sand Co. has expanded its facilities again during the year 1930 to meet the demands for additional special sands in the glass, blast and filter trade. Our business for 1930 to date is 26 per cent ahead of that of 1929, and we considered 1929 a good year. We are confident that the balance of this year will continue to show an increase. This is due largely to the demand for a standard-practice product based on effective size and coefficient-range to meet industrial needs in this section of the country, covering a range of white abrasive sands, which in our particular case is known as "silica crystals." We have increased our wet-sand capacity 50 tons per day, and our drying capacity about 20 per cent. Also our motivated-gravity washing system has been enlarged and expanded to bring about the separation of our product, at a given point dividing itself for the various lines of industrial demands for our products.

Our business has averaged in excess of 1,500 tons per month for the year 1930, and we hope to increase this 500 tons per month for 1931. Our prices have remained stable.

THE CRYSTAL SILICA SAND CO.
Los Angeles, Cal. J. A. Benell, *Pres.*

Over-Building in Past Anchor for Texas Town

The outlook for the future is anything but rosy; throughout this section we are badly over-built both in residences and in business buildings. For the next 12 to 15 months it appears to be a matter of "just hanging on."

Wichita Falls, Tex. J. E. Duncan.

Truck Competition Will Hold Aggregate Prices

We summarize the outlook for 1931 related to our business as follows:

Business will be highly competitive with truck deliveries making heavy inroads from the points of production to rail destinations, with no improvement in prices and no gain in volume of sales.

MORTON SAND & GRAVEL CO.
Chicago, Ill. Geo. H. Hartong, *Gen. Mgr.*

Kentuckian Tells What's Wrong with U. S. and Why

The principal reasons for the depression are: First everyone is trying to spend six dollars when he earns but one. He is buying gasoline instead of buying food and paying debts. The farmers are in the cities and towns instead of following the plow. The merchants in small towns are killed by the good roads leading to the large cities, where the customers flock to spend their cash, expecting the home merchants to carry them in times of need. Home-making has been forgotten and the people are pleasure-mad. The thousands of filling stations get the money that used to go for shoes, calico, cotton, coffee, sugar, and other provisions. Whisky, being bought at about $25 per gal., actually costs 35 cents to manufacture. All business is in the hands of the gamblers instead of the producers. Mortgage books are filled with automobile loans, and homes have been lost trying to pay them. Many millions of automobile wrecks in the junk-pile represent a big part of the nation's wealth. Banks lend the big fellow on tissue-paper security, and refuse the poor man credit. One twentieth of the automobiles are paid for, and last, but not least, with no one staying at home, the world is on wheels. This might seem a peculiar view, but I defy contradiction.

BLACK HILLS MICA & MINERAL CO.
Hawesville, Ky. Col. L. S. Powers, *Vice-pres. and Gen. Mgr.*

Weakening Stock Market Slows Present Recovery

It appears that business is a little better, in other words, a little more confidence and a bit more optimism are being shown, with the stock market acting somewhat better. But it is the writer's opinion that January and February will see even a lower stock market than we have had this fall. I believe that such a market will reflect on business and that we will not have any improvement during that period.

I am basing this opinion on the theory that many of the large corporations whose stocks are traded in will show statements none too good for the year 1930. These statements should be published during the months of January and February and, when they appear and show adversely as compared to 1929 and 1930, they will affect the stock market.

Our business is that of supplying molding sand to the foundries in 17 states. It seems that the foundry industry is quickly affected by adverse business conditions or stock market reports, consequently, it has its effect on us.

On the whole, the year of 1931 should be an improvement over 1930, but I do not look for any startling improvement insofar as I am able to ascertain in a review of past panics. We have always taken from 1½ to 3 years to make a complete recovery, and this appears to be about the worst condition we have ever had. Another very bad feature that will affect 1931 has been the wholesale failure of both large and small banking institutions. While I am not pessimistic, by any means, I cannot at present see what would be called a return to normalcy in 1931 for general business.

HOUGHLAND AND HARDY,
Evansville, Ind. C. M. Hardy, *Pres.*

Sees 50-Per Cent Boost In Kansas City Business

I can see no chance of business being less in 1931 than it was in 1930.

Business conditions in and around Kansas City for the past year have been about 40 to 45 per cent of what they were for a like period in 1929. We expect conditions in 1931 to be approximately 50 per cent better than they were in the past year. This is the writer's opinion after having made a survey of prospective business in sight as compared with similar conditions one year ago.

DEITZ HILL DEVELOPMENT CO.
Kansas City, Mo. H. P. Thomson.

Florida Sand Producer Awaits Federal Program

Just at the present time there is not a great deal of prospects for large construction for the year 1931, except jobs that have been promoted by the United States government for public building. But most of these have been discussed for the past two years, and at the progress they are making, it will be possibly two years or more before anything is done.

We, therefore, have very little to be optimistic about for the year 1931.

INTERLACHEN SAND & GRAVEL CO.
Jacksonville, Fla. John D. Baker, *Pres.*

Shows Confidence Through New Equipment Purchase

Regardless of present conditions I am now improving my plant,—virtually doubling its capacity. These improvements consist mainly of a large gyratory crusher, additional screens, bins, conveyors, steam shovel and a washer.

CANOE CREEK STONE CO.
Loretto, Pa. Blair C. Seeds, *Pres.-Gen. Mgr.*

Gypsum Head Hopes for Some 1931 Improvement

We do not look for any increase in volume for 1931. Our hope is that after the middle of the year there will be some improvement and that we can at least finish the year with a volume that will parallel 1930.

NATIONAL GYPSUM CO.
Buffalo, N. Y. M. H. Baker, *Pres.*

Another Stone Producer Cheerful for New Year

It is somewhat early to forecast business in our line for 1931, as the program of public construction work is not sufficiently outlined at this time. Indications, however, are that a large amount of money will be spent on highway projects, and as that field absorbs the largest percentage of our output, we are hopeful for good business next year.

FEDERAL CRUSHED STONE CORP.
Buffalo, N. Y. H. W. Snyder, *Pres.*

Reduced Iowa Paving to Lower Aggregate Output

From our point of view, the business will not be quite as good for 1931 as it was in 1930 for the reason that we will have less road construction in Iowa than we had in 1930. Yet we believe that the commercial business in general will be a little better, at least from present indications.

EMPIRE SAND & MATERIAL CO.
Marshalltown, Ia. W. S. Keller, *Prop.*

Expresses Optimism by Improving Quarry, Plant

We feel that we have good reason to be optimistic. In the first place, this has been the best year in the history of our company, while during the same period almost half of the projects that came up were postponed until another season.

If the jobs that were postponed go through, seemingly the building industry will be as busy as it was last year. Of course, that does not mean much in some localities. We know where several hundred thousand dollars will be spent both in landscaping and building, not of a speculative nature, within the next year or two.

Acting on our own convictions, within the last few months we have increased the capacity of our quarry at least 50 per cent. We have stripped fully three acres, built additional side tracks and made other improvements to facilitate the prompt handling of business. None of these improvements would be necessary if we were not enthusiastically optimistic as to our 1931 business.

LANNON QUARRIES CORP.
Beaver Dam, Wis. C. A. Starkweather, *Pres.*

Road Bond Issue to Aid Southern Aggregate Men

I believe the year 1931 will be a banner year in the construction field because the states are making every effort to push the construction of roads, bridges and municipal works to aid in the unemployment situation.

In this state and in the state of Louisiana, the outlook is exceptionally good as there has been voted nearly $200,000,000 for roads, bridges and municipal works; and the government will spend additional millions in the improvements of waterways.

NEW INLAND GRAVEL CO.
Hattiesburg, Miss. B. M. Campbell, *Gen. Mgr.*

Texan Sees Rosier Hue at Dawn of Coming Year

Conditions of the sand-and-gravel business in Texas during 1931 should be better in our territory than 1930 on account of the prospective increase in road work. Small construction should also increase because of the fact that it was very slow last year. New construction which has been planned will probably not be deferred many months.

MIDLAND SAND & GRAVEL CO.
Terrell, Tex. L. W. Wells, Jr., *Pres.*

Confidence Needed, Says Penn-Dixie Cement Head

In The Pen Dixie—Copy 403

In the Penn-Dixie organization we hold to the belief that faith in this country's future, supported by properly directed activities, will make business increasingly better.

Practicing what we preach, we continued during 1930 our program of plant improvements designed to increase efficiency, further reduce costs and to render a greater measure of service to the trade; and we intend to do the same in 1931.

Our conception of the outlook is that this country's business enterprise will not fail to grasp the opportunity, afforded by this resting period, to plan constructive movements which will hold our position of leadership.

PENNSYLVANIA-DIXIE CEMENT CORP.
Blaine S. Smith, *Pres.*
New York, N. Y.

General view of plant from northwest with primary crusher building at left. Truck loading and screening buildings in center with scalping screen building at extreme right.

Trap-Rock Operation on Hudson River an Outstanding 1930 Development

Gigantic Plant Designed for an Ultimate Capacity of 1,200 Tons of Stone per Hour

By W. E. TRAUFFER

DUE to the keen competition which exists in the crushed-stone industry, and in almost any other important industry, it has become imperative that production costs be reduced to a low level which only a few years ago would have been considered impossible. This holds true not only for the large operator whose market is in a large industrial center but for the smaller operator whose market lies in a smaller community where competition is just as keen. In each case the problem is the same, although on a different scale, and must be solved in the same manner.

The only type of plant which can operate profitably under present-day conditions is one of the most permanent type of construction using equipment of the most modern type which has proved its durability and economy of operation in actual use. Such a plant should be built entirely of concrete or concrete and steel, which, although higher in first cost, is the most economical in the long run. The use of the best types of equipment available also involves a greater first cost but this is soon overbalanced by its longer life, greater production and more economical operation. It is also wise to build a plant with provisions for future enlargement and with sufficient flexibility that future developments can be incorporated without necessitating reconstruction of the plant. The expense of such a plant, of course, is justified only where there is a fairly steady demand for its product and where there is an ample supply of raw material of known quality.

The new plant of the New York Trap Rock Corp., at Stoneco, N. Y., is such a plant. It is also one of the largest plants now operating, but this fact should not detract from its interest to the smaller operator as the problems encountered in its design, construction and operation are the same as those in a smaller plant except that they are on a larger scale. This plant incorporates all the important features outlined above and many others of lesser importance, all of which are described in the following article. The fact that this plant has now completed its first season of operation without requiring a single important change or repair and without a serious shutdown is a tribute to the soundness of its design and construction.

The location of this plant at Stoneco on the east bank of the Hudson River five miles south of Poughkeepsie is the same as that of the old plant formerly known as the Clinton Point plant which it replaced. The new plant occupies almost exactly the same site as the old plant, which, with the exception of the crusher house and conveyor A which are described later in this article, was entirely dismantled. Construction of the new plant was begun on Oct. 1, 1929, and it went into operation on April 18, 1930. The washing plant was in operation on May 1, 1930. As the old plant was operated until December 15, 1929, when dismantling was begun, and operations are ordinarily shut down from about that date until March 1 of the following year, there was actually only one month's loss of production due

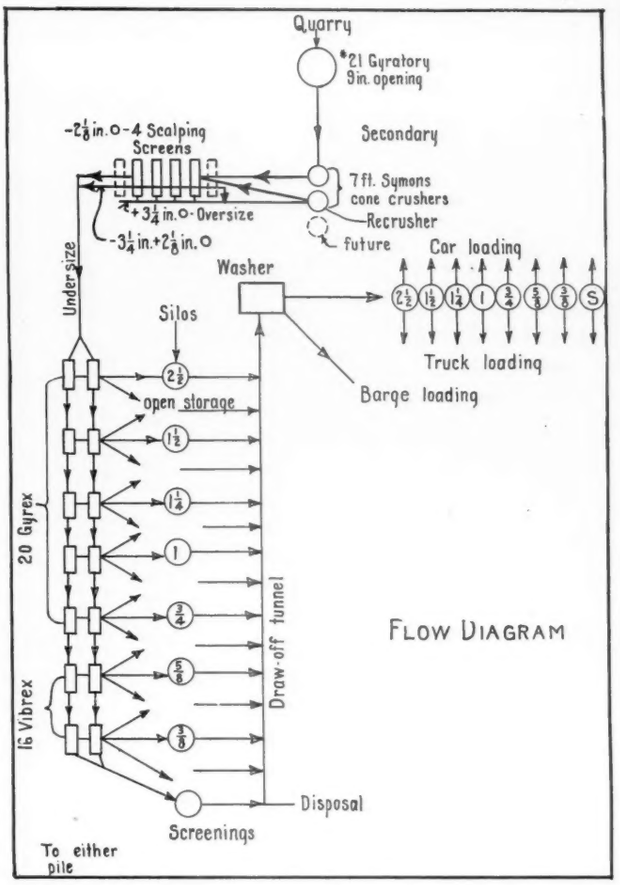
to the construction of the new plant. This record is all the more remarkable in view of the fact that considerable blasting was necessary to clear the space for the new plant and that some of this had to be done while other parts of the plant were under construction.

The plant consists of seven main buildings which are numbered in the order in which they function in the flow of the material through the plant. Each building has a metal plate at its main entrance giving its number and the operations or departments housed within it. These buildings are listed below.

Bldg. No. 1—Primary crushing.
Bldg. No. 2—Secondary crushing and recrushing.
Bldg. No. 3—Scalping.
Bldg. No. 4—Sizing and storage.
Bldg. No. 5—Washing.
Bldg. No. 6—Car and truck loading.
Bldg. No. 7—Office, storeroom, machine and blacksmith shop, compressor, and electric shop and storeroom.

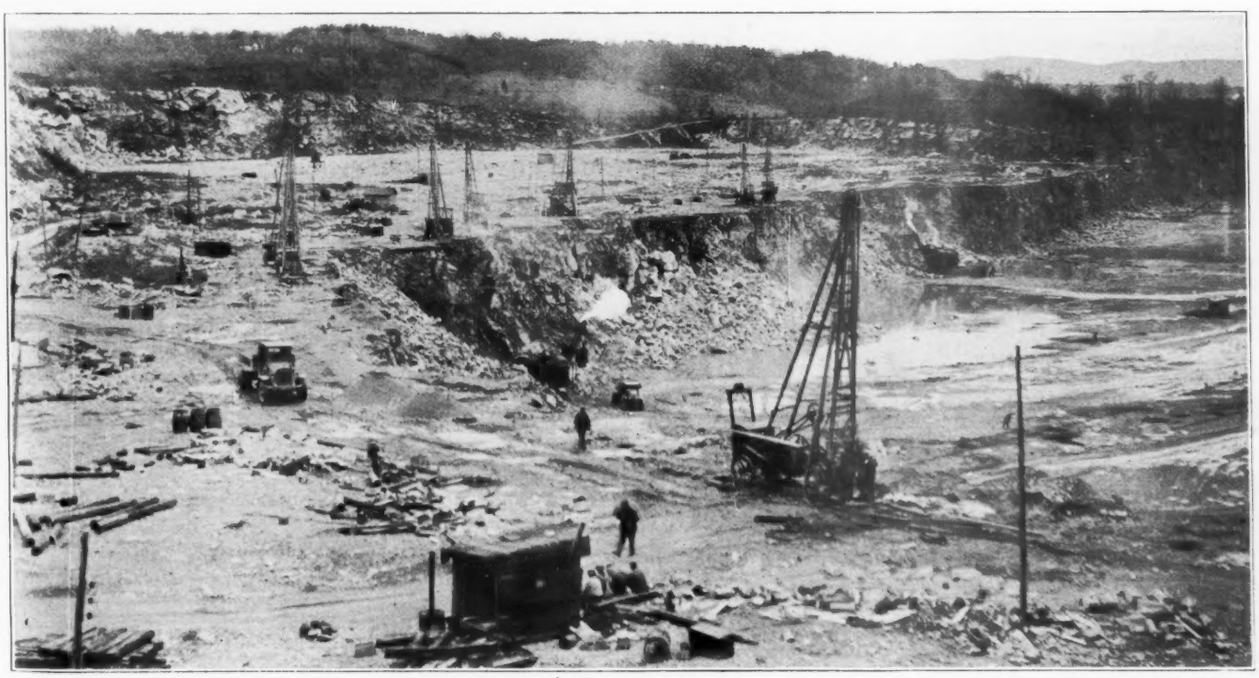
All buildings are of slip-form concrete construction excepting building No. 1, building No. 4 and the conveyor housings. Steel-sash windows and Irving steel stairs and grating are used throughout the plant.

The plant, in spite of its size, is not at all complicated, but to make it easier for the reader to follow the flow of material a flow sheet and a brief description of the flow are given. The flow sheet is schematic only and bears no resemblance to the actual ground plans of the plant. From the primary crusher through the plant, conveyors are designated in alphabetical sequence as nearly as this is possible. Altogether there are 32 belt conveyors, but there are numerous pairs of conveyors that work in coordination and each such pair is assigned one literal designation. In this scheme conveyor A handles stone from the primary crusher while the last or X conveyor carries screenings to a disposal dump.



Flow sheet of the plant.

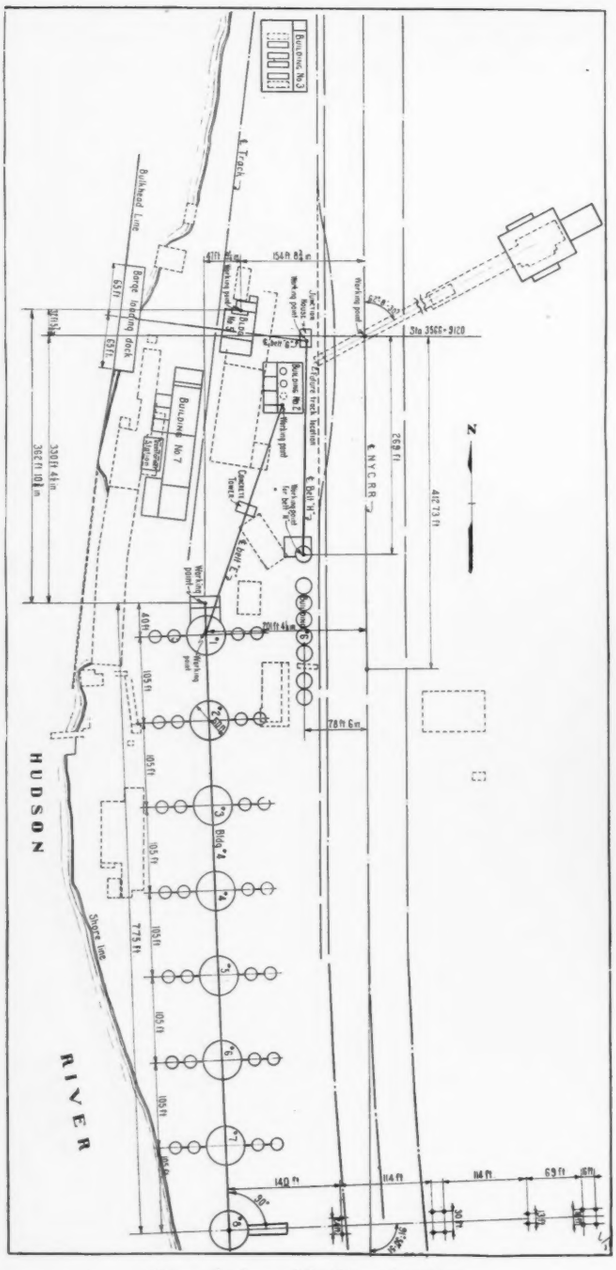
The new plant was designed under the direction of Sterling Tomkins, vice-president of the New York



A view of the quarry showing some of the well drills with two of the smaller shovels loading below.

Trap Rock Corp., in charge of operations, with the assistance of E. Lee Heidenreich, Jr., chief engineer and general superintendent. The Burrell Engineering & Construction Co. prepared the general plans into which the details were later incorporated. This company also received the construction contract which included all buildings, concrete work, conveyor bridges, etc. The company erected all the concrete work, but sublet the steel contract to the Lackawanna Steel Construction Corp., which fabricated and erected all the structural-steel work amounting to a total of 2,200 tons. All excavating work and installation of machinery was done by the owning company.

The material goes from the Allis-Chalmers No. 21 gyratory primary crusher in building No. 1 to two 7-ft. Symons cone reduction crushers in building No. 2. The stone then goes to building No. 3 to four



General plan of building locations.

A view from bank of Hudson River showing silo and retaining-wall construction of building No. 4.

Alice-Chalmers revolving scalping screens and two Robins vibrating screens. The oversize goes back to one of the Symons cone crushers for recrushing and again through the scalping screens. Undersizes from these screens go to building No. 4 which is mounted on eight concrete silos. Each silo has its set of Robins vibrating screens of which 36 are used in all. Each of silos 1 to 5, inclusive, has four Gyrex screens while silos 6 and 7 each has eight Vibrex screens. These silos, with the spaces between them, have a total storage capacity of 142,000 cu. yd., of which 100,000 cu. yd. can be reclaimed through a tunnel under the silos. The sized stone then goes to the washer building, from which it goes to the boat and barge or car- and truck-loading departments.

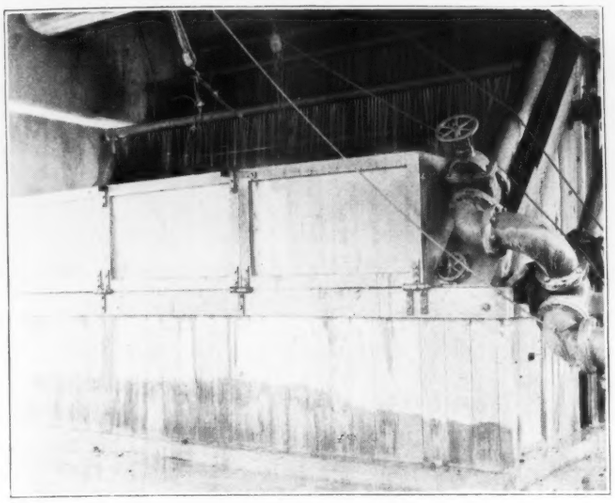
The primary crushing department and all conveyors and buildings are designed for an ultimate capacity of 1,200 tons per hour, approximately

Aerial view of old Clinton Point plant.

double the present capacity. In the secondary crusher building the Symons secondary crusher is now operating almost at capacity, while the re-crusher has comparatively little to do. To double the capacity in this department it would only be necessary to install a third Symons crusher to assist the present secondary. The foundation for this crusher and its bin and Robins No. 3 feeder are now in place. In building No. 3 space was left for two

additional scalping screens to assist those now in operation.

In the screening building all that would be necessary would be the installation of a third series of conveyors and vibrating screens for which all provisions have been made. As the present production does not approach the capacity of the present two sets of screens, this third set would easily handle the doubled output. Two additional pumps would be required in the washer building but the two loading departments have ample capacity.



Bottom of stone washer showing arrangement of jets.

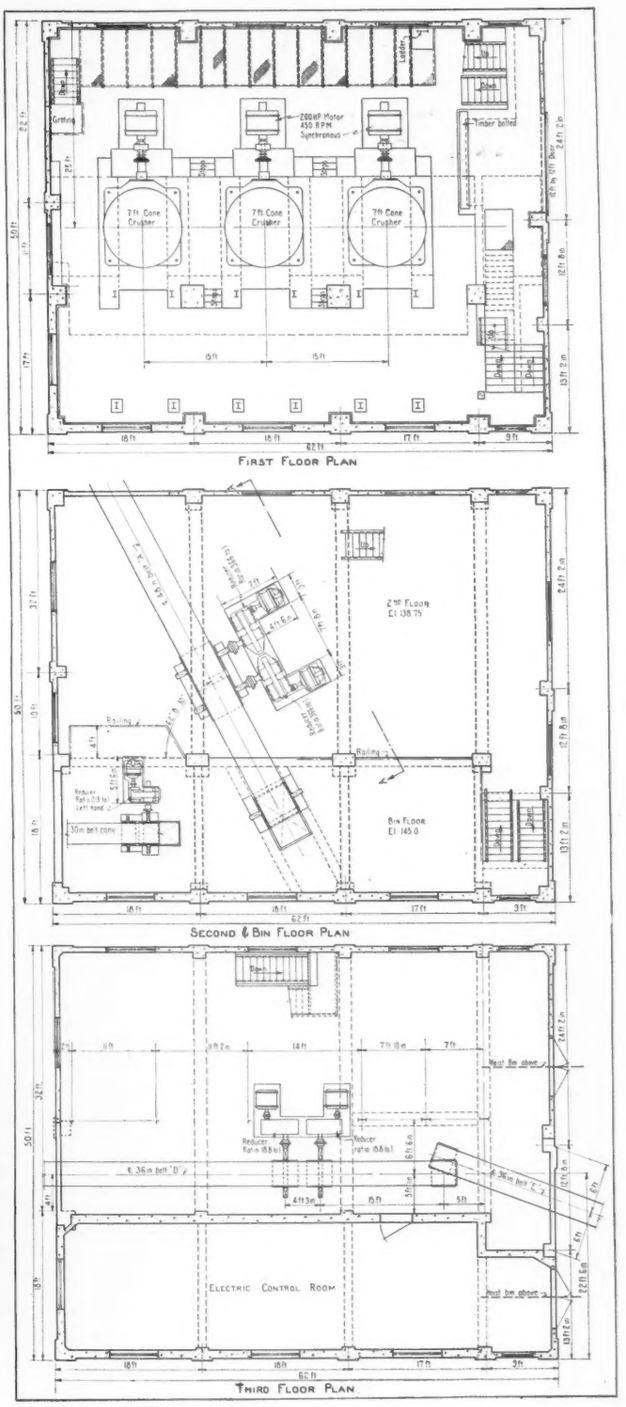
Quarrying Operations

The quarry, which is to the east of the plant, has been worked into the bluff along the Hudson River. It is one of the oldest existing quarries in this section of the country, having been opened in 1879. Since that time it has been owned by many different companies until it finally came into the hands of the present owners in 1919. The history of the quarry and the various types of plants and methods of operation used since operations were begun 50 years ago furnish a good cross-section of the progress in the crushed stone industry during that period, from the most elementary methods to the present modern type of operation. A complete outline of the history of this quarry was given in a preliminary description of this plant published in PIT AND QUARRY February 26, 1930.

The stone in the quarry is not a trap rock but a light-colored sedimentary dolomite or magnesian limestone. It is estimated that there is enough of this stone to keep the plant operating at full capacity for 40 years or more.

The quarry floor is approximately on a level with

A view showing building No. 7 with washer building at rear and secondary crusher building at right.



Floor plan of building No. 2.

the plant and has sufficient slope to make it self-draining. Two levels have been worked in the past but only the lower level, which averages 62 ft. in height, is being worked at present. The overburden, which averages about 5 ft. in depth, is being removed by a Northwest gasoline dragline equipped

Looking down from screening building on boat loading at dock. Building No. 7 and outdoor substation in foreground.

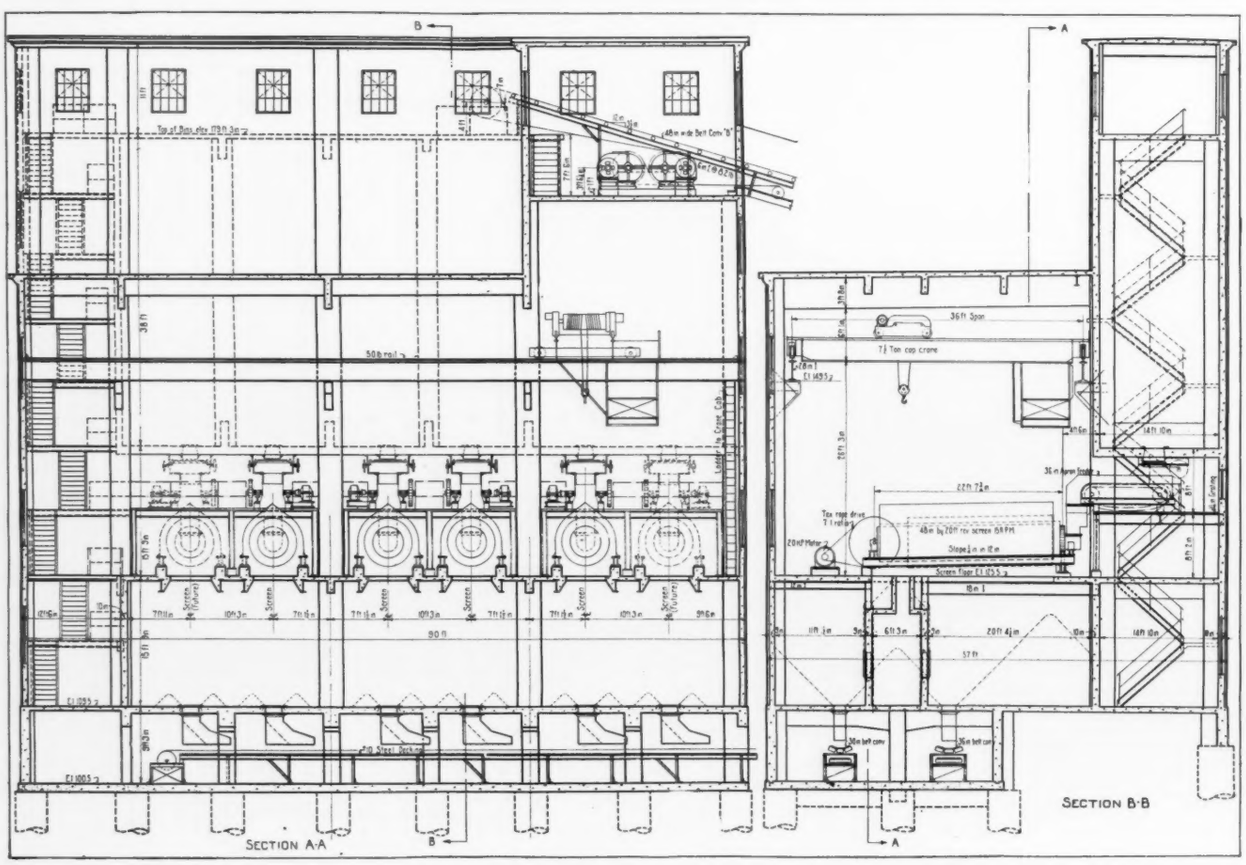
with a Page 1¼-cu. yd. dragline bucket. This loads into trucks which haul the dirt away to a dump. For the most part the surface of the rock being uncovered is fairly smooth and level but occasionally a pocket is encountered with as much as 20 ft. of dirt. In these cases all dirt that cannot be reached by the dragline is shoveled out by hand labor to where the dragline can get it. These precautions

The electric shovel loading stone into trucks.

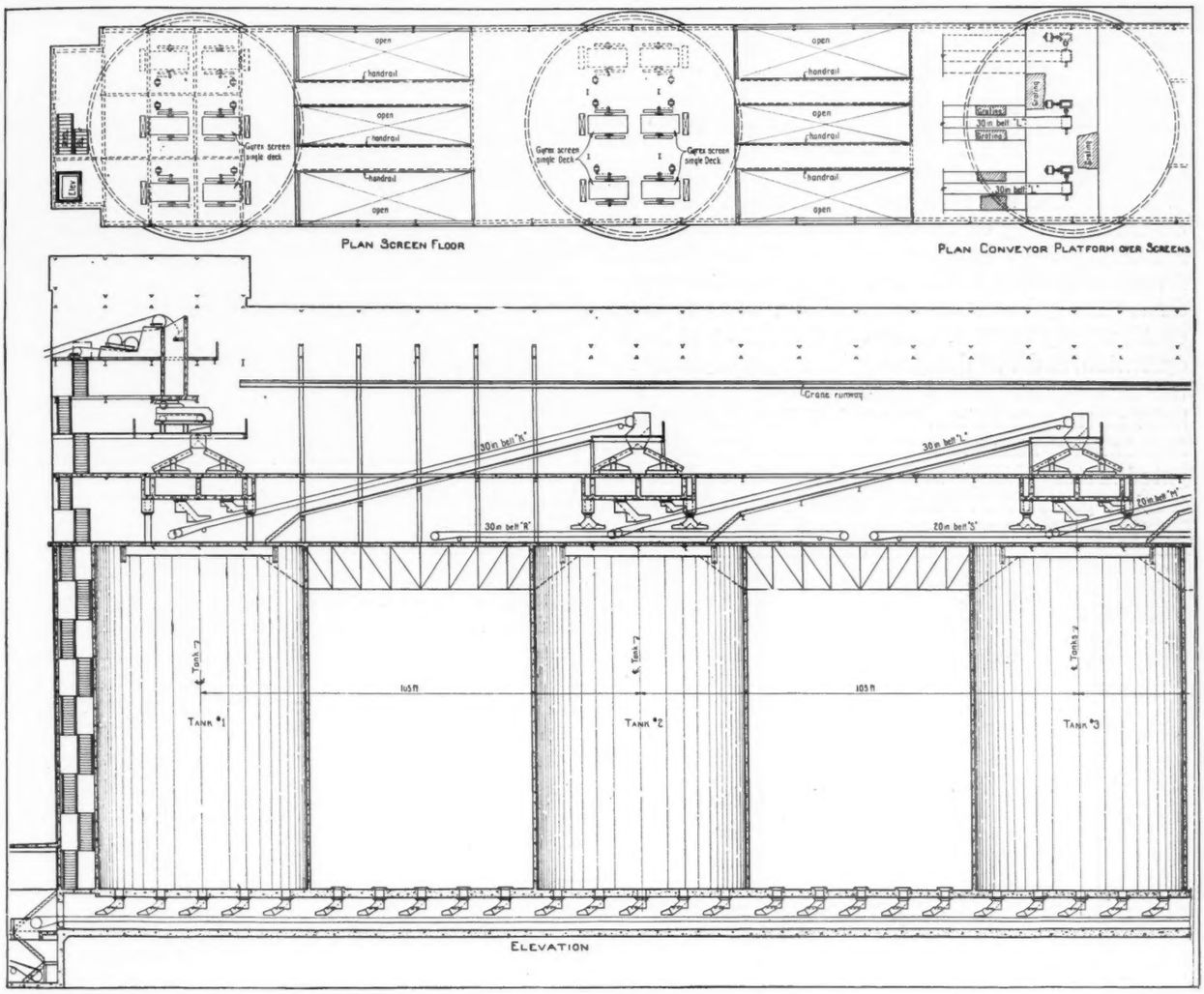
are in line with the great care taken throughout the quarry and plant operations to insure a clean product.

Drilling of blast holes is done with two Sanderson Cyclone 8-in. well drills, a Keystone 6-in. well drill and seven Cyclone 6-in. drills, all electrically operated. All 6-in. well drills are now being converted to 8-in. machines. Blasts are made at frequent intervals and are not unusually large. The average blast is a single-row bank shot of about 11 holes using 12 cases of dynamite to the hole. Du Pont, Hercules and Atlas dynamites are used together with Cordeau-Bickford safety fuse. Secondary drilling is done with 15 Ingersoll-Rand Jackhamers.

Loading of stone in the quarry is done by a Bucy-



Sectional view of building No. 3.

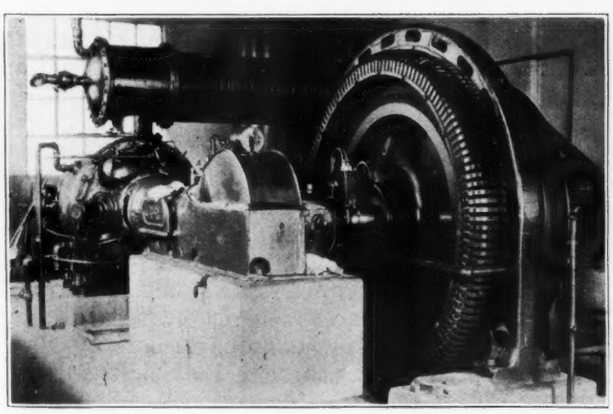


Plan and section of building No. 4.

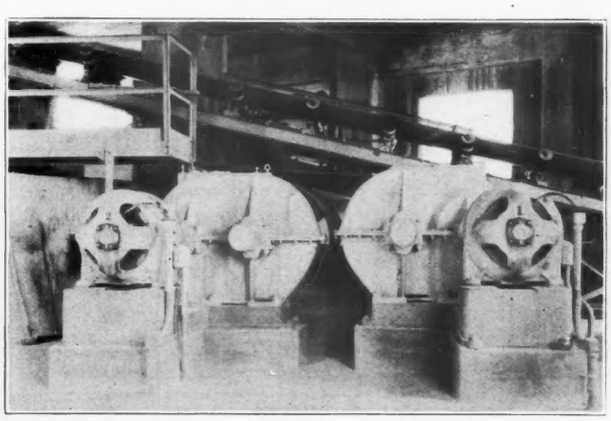
rus-Erie 100 B electric shovel and three Bucyrus-Erie 50 B steam shovels. These load the stone into twelve Mack 7½-ton trucks with Easton 5-cu. yd. steel side-dump bodies which haul the stone to the crushing plant. The nature of the stone deposit makes it possible to keep the quarry floor smooth enough to operate these trucks without great effort.

Primary Crushing

The trucks haul the stone a distance of from 1,200 to 1,500 ft. to the primary crusher building which is known as building No. 1. Here the trucks go in either of two entrances and discharge from both sides into the Allis-Chalmers No. 21 gyratory primary crusher which reduces to 9-in. size and



The air compressor with receiver tank in background.

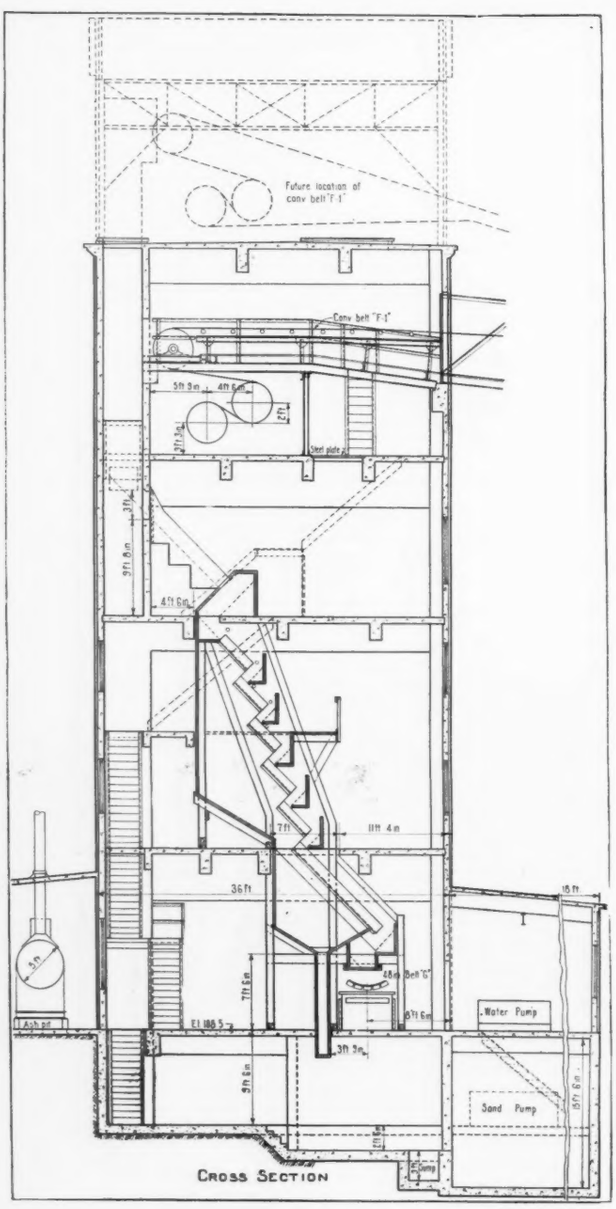


Typical tandem speed-reducer drive of conveyor No. 1 from the primary crusher.

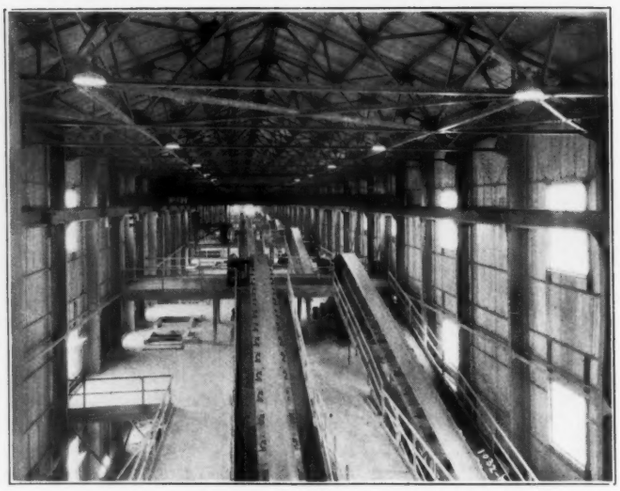
under. The trucks are dumped by two mechanisms of the company's own design. Each of these mechanisms consists of two structural-steel inclined

tracks on each of which is a steel traveler with a hook suspended from it. Each of the units has a Shepard 20-hp. 3,125-lb.-capacity electric hoist operating both travelers which dump the trucks. This system is capable of handling the full capacity of the plant should it ever be enlarged.

The primary crusher is belt-driven by a 250-hp. Westinghouse Type CW induction motor. A P & H 40-ton traveling crane over the crusher is used to handle repair parts or large stone. At the discharge from the crusher a Norblo Size 45 fan removes the dust. The primary crusher building was put in operation early in 1928, while the old plant was yet in operation, and was designed with ample capacity for the new plant. The gallery for Conveyor A was built at the same time. This building has concrete foundations, structural-steel framework and corrugated-metal siding and roofing. The concrete crusher pit is 40 ft. below ground level.



Sectional view of building No 5.



View of screening floor showing series of conveyors carrying stone to sizing screens and space for future expansion.

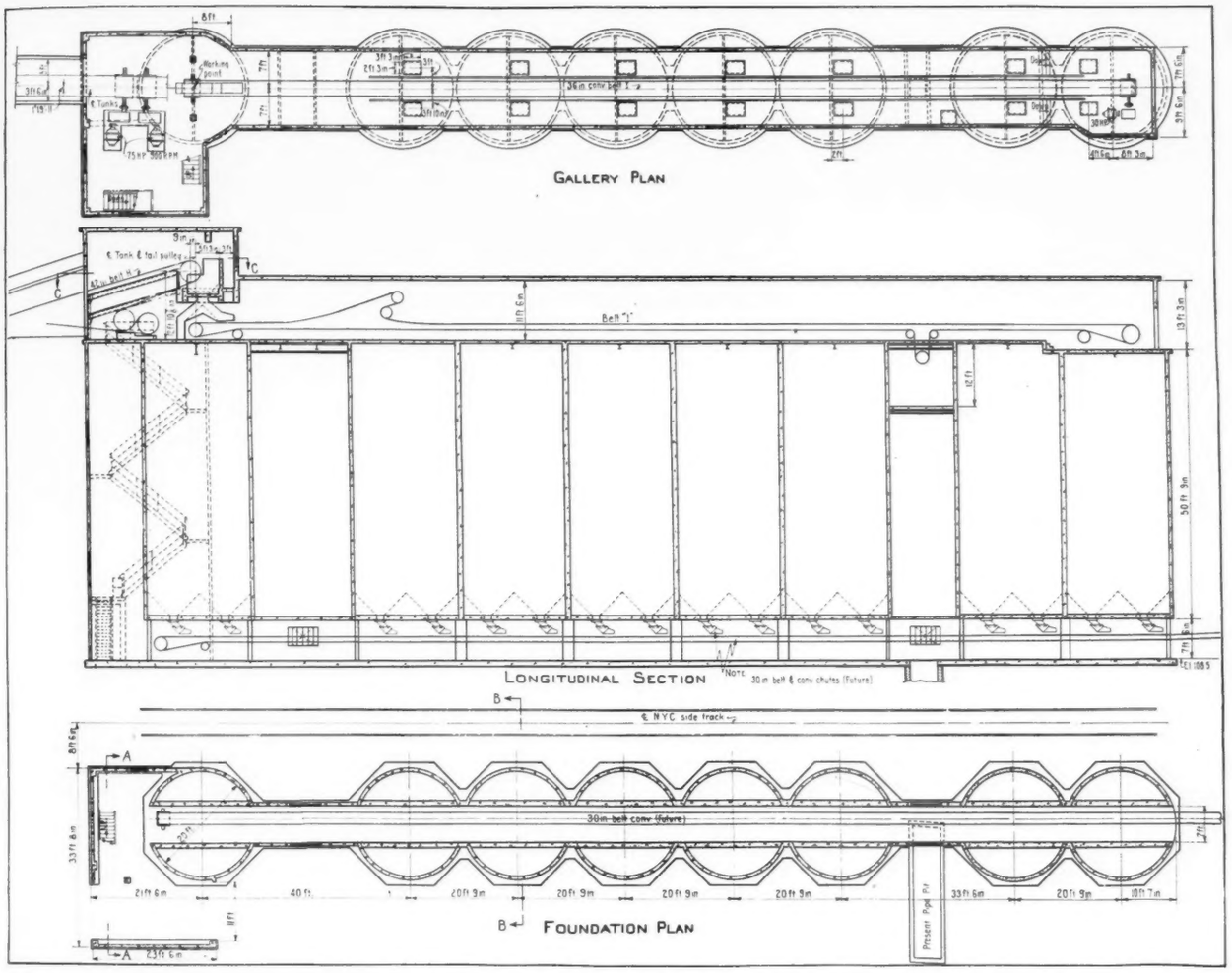
The primary crusher discharges directly onto Conveyor A to the No. 2 or secondary crushing building. This conveyor is 48 in. wide and on 448-ft. centers and is driven through a tandem drive by two 100-hp. Allis-Chalmers motors and two Falk herringbone speed reducers. This conveyor is inclined from the crusher for a distance of 245 ft. and then runs horizontally through a gallery over the New York Central tracks to building No. 2, where it is again inclined for a distance of 115 ft. at the drive end.

Secondary Crushing and Scalping

This conveyor discharges into a three-compartment concrete bin of 400 cu.-yd. capacity from the center compartment of which a 42-in. Traylor manganese-steel apron feeder discharges into the first of two Symons 7-ft. cone reduction crushers. This feeder is mounted on rails and can be pulled back from its discharge position over the crusher when desired. A 20-ton capacity P & H overhead crane handles repair parts for the crushers and feeders. Each crusher is driven by an Allis-Chalmers 200-hp. synchronous motor and each feeder by a 15-hp. variable speed motor.

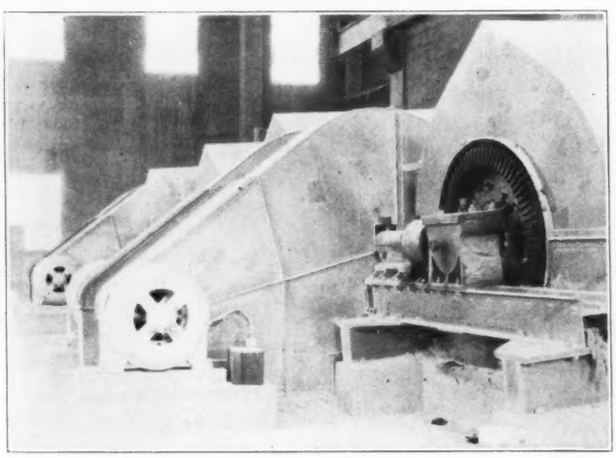
The Symons reduction crusher discharges directly onto inclined belt Conveyor B to the No. 3 or scalping screen building. This conveyor is 48 in. wide, on 430-ft. centers and is driven through a tandem drive by two Allis-Chalmers 100-hp. motors and Falk herringbone speed reducers. Conveyor B discharges into a six-compartment concrete bin of 700-cu. yd. capacity. Traylor 36-in. manganese-steel apron feeders discharge from the bins to four Allis-Chalmers 48-in. by 20-ft. revolving scalping screens and to two Robins 4-ft. by 8-ft. single-deck vibrating scalping screens.

The revolving screens are enclosed in dust-proof housings and are driven by 25-hp. motors through Texrope drives. The vibrating screens are Texrope driven by 5-hp. motors and the feeders by 10-hp. variable-speed motors through Falk right-angle reducers. A P & H 7½-ton crane in this building handles repairs. Three sizes of stone are produced



Plans and sections of building No. 6.

here—minus 2⅛-in.; 2⅛-in. to 3¼-in.; and over 3¼-in. The oversize goes to Conveyor C which returns the stone to the secondary crusher building. Here the stone discharges to the second bin, feeder, and Symons 7-ft. cone recrusher alongside the first, the entire unit being similar to that doing the secondary crushing. Conveyor C is 20 in. wide and on 422-ft. centers and is driven by a single 30-hp. motor and a Falk right-angle speed reducer. An opening in the side of the first bin allows some of the stone from the primary crusher bin to go to the second Symons crusher.



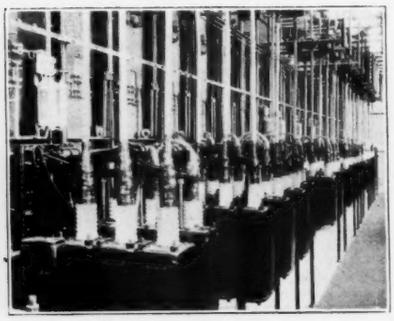
The four inclosed revolving scalping screens in building No. 3.

The 2⅛- to 3¼-in. stone can be recrushed in the same manner or it can be sent with the minus 2⅛-in. stone to the No. 4, or screening and storage building. The stone for building No. 4 discharges onto belt Conveyor D which is 36 in. wide and on 450-ft. centers. This conveyor returns the material to the top of building No. 2, which, as may be seen in the plant layout, occupies a position between buildings Nos. 3 and 4. Here it discharges onto inclined belt Conveyor E which carries the stone to the top of the screening building. Conveyor E is 36 in. wide and on 301-ft. centers. Conveyors D and E are each driven through tandem drives with Falk herringbone speed reducers by 75-hp. motors. The discharge from the pan feeders to the Symons crushers and the discharge from the crushers onto the conveyor to the scalping screen building are connected to a seven-unit Norblo dust collector. This is located outside and alongside of the building. The dust goes from the collector to the dirty-water sump in the washer building where its disposal is as described later in this article.

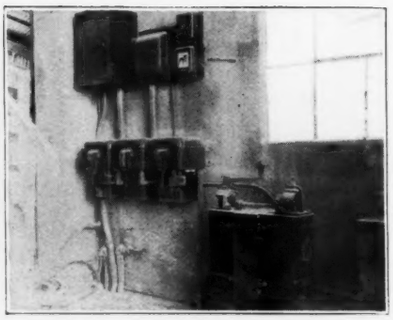
Final Screening and Storage

The screening building or No. 4 is a structural-

Front of main switchboard showing number of spare panels.



The back of the main switchboard also showing spare panels.



Type of dual control used for tandem conveyor drives.

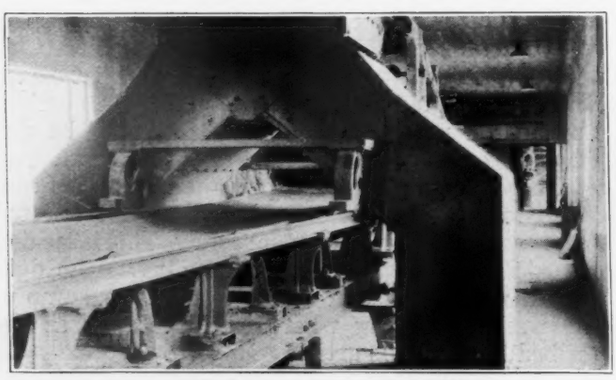
steel building mounted on top of eight concrete storage silos. These silos are each 50 ft. in diameter by 80 ft. high and are placed on 105-ft. centers in a straight line. Each silo stores a separate grade of stone and the spaces between the silos are used for open storage of sized stone. The screening building itself is 780 ft. long by 45 ft. wide and its eaves are 140 ft. above ground level. The tops of the silos are used as the conveyor floor while the screens are on a concrete floor 16 ft. above this.

The storage spaces have retaining walls formed by the silos and by concrete walls extending 46 ft. outward in both directions from each silo at right angles to the center line of the building. To insure stability, should one storage space be loaded up more than another, each of these walls was built in the form of outlying pairs of small silos with intermediate webs or walls. The first silos are 15 ft. in diameter by 35 ft. high while the outer silos are 15 ft. in diameter by 21 ft. high.

Conveyor E discharges the stone into a 40-cu. yd.-capacity concrete bin at the top of the building. Two Traylor 36-in. manganese-steel apron feeders are fed through Weller rack-and-pinion gates and discharge the stone through split chutes into the first battery of four single-deck Robins Gyrex screens which have 2½-in.-mesh wire cloth. The oversize (over 2½-in.) from this set of screens is chuted directly into silo No. 1. The material passing through these screens discharges onto the twin inclined Conveyors K which feed to the next set of four sizing screens above silo No. 2. The oversize from the second set of screens drops through a split chute either directly into silo No. 2 or onto a horizontal belt Conveyor R to open storage between silos Nos. 2 and 3. The throughs from this second set of screens go by twin inclined belt Conveyors L to the third set of screens.

In this manner the oversizes from the various sets of screens are sent to open storage on Conveyors R, S, T, U, V and W, while the undersize progresses from silo to silo on twin Conveyors K, L, M, N, O and P. Each of the six pairs of inclined conveyors operates on 110-ft. centers and each conveyor is driven through a Falk right-angle reducer. Conveyors K and L are 30 in. wide and are driven by 30-hp. motors, while Conveyors M, N, O and P are 20 in. wide and are driven by 10-hp. motors. Each of the six horizontal distributing conveyors is reversible and can discharge to either of two open storage spaces. Conveyor R is 30 in. wide, while the other 5 are only 20 in., but they all operate on

Horizontal distributing conveyor to stock-piles with conveyors to next set of screens and chutes to silo storage.

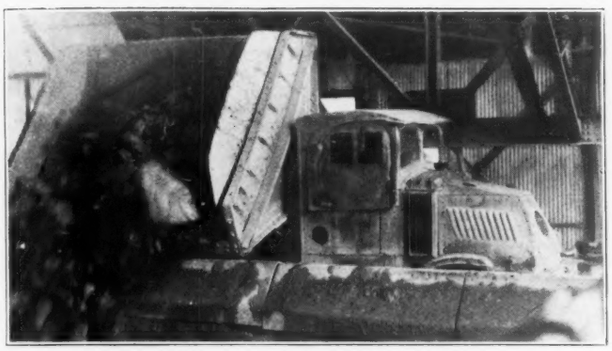


The traveling tripper which distributes stone to various silos of car- and truck-loading building.

97-ft. centers. Each of these conveyors is driven by a 5-hp. motor through a Falk right-angle reducer.

As has been previously stated, each of the first five silos has four single-deck Model 48-120 Robins Gyrex screens while silos 6 and 7 each have eight single-deck Model 42-120 Robins Vibrex screens which are preferred for the smaller sizes of stone. The Gyrex screens are all driven by 5-hp. motors through Texrope drives and the Vibrex screens by direct-connected 3-hp. motors. The throughs (under ⅜-in.) from the last set of Vibrex screens over silo No. 7 drop to twin Conveyors Q which discharge into silo No. 8. These conveyors are 20 in. wide and on 106-ft. centers and each is driven through a Falk reducer by a 5-hp. motor. The screenings are at present taken from the silos

through side gates by inclined Conveyor X. This takes the screenings to a small hopper on top of a hill above the plant from which they are hauled to a storage pile by two Mack trucks. This conveyor is 20 in. wide and 465-ft. centers and is driven by a 30-hp. motor and a Falk right-angle speed reducer through a double-head pulley drive. This is the only double conveyor drive in the plant with a single motor and reducer and with the second drive pulley gear-driven from the first. Like all the other conveyors it is enclosed with corrugated metal and is supported on structural-steel framework. A 3-ton P & H traveling crane travels the full length of the screening building over the screens and extends out over silo No. 8 so that it can raise a load from the ground to the top of the building. An American



Truck discharging load of stone to primary crusher. Dumping apparatus in rear.

Elevator & Machine Corp. 1,500-lb.-capacity passenger elevator gives access to all floors of this building.

Stone is recovered from the storage piles or silos by Conveyor F in a tunnel which extends longitudinally under the silos. Five 2-ft. square openings on 10-ft. centers under each of the seven storage spaces and each of the first seven silos feed any desired size of stone onto this conveyor through special drop-chute gates. Silo 8 is provided with three holes, each 2 ft. wide by 6 ft. long, which feed the screenings onto this conveyor when there is a demand for this size. Conveyor F is 48 in. wide and on 870-ft. centers and is driven by a 75-hp. motor through a Falk herringbone reducer. Conveyor F discharges onto inclined Conveyor F-1, which carries the stone to the top of the washing building. Conveyor F-1 is 48 in. wide and on 370-ft. centers and is driven through a tandem drive by two 100-hp. motors and Falk herringbone reducers. Conveyor F-1 flattens

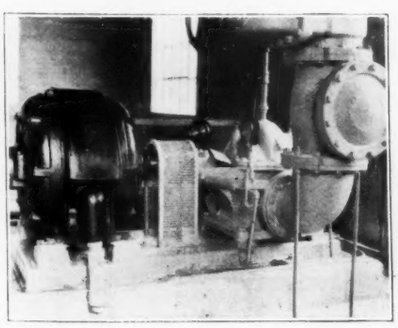
Loading a truck at one of the bins.

out near the top of the building and is almost horizontal at its discharge point. This feature makes it possible to increase the head room and the washing capacity by adding to the top of the building and straightening out the conveyor to suit.

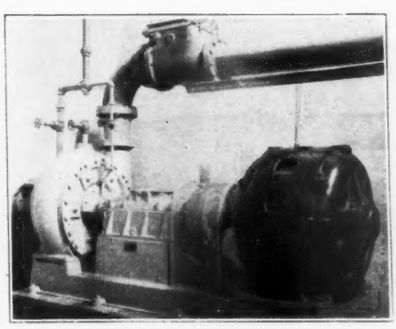
At building No. 5, the washer building, Conveyor F-1 discharges into a concrete bin of 18-cu. yd. capacity on the third floor. This feeds by gravity to the four-compartment Berry washer which is similar to the one at the company's plant at Tomkins Cove, N. Y., which was described in the Jan. 1, 1930, issue of PIT AND QUARRY. This washer was designed by the company's master mechanic, William Berry, after whom it is named. It consists of a series of baffles and $\frac{1}{8}$-in. or $\frac{1}{4}$-in. inclined stationary screens over which the stone cascades under sprays of water furnished at the rate of 3,000 g.p.m. The washer is 60 ft. high by 30 ft. long and has 407 sq. ft. of screen surface. It has a capacity of 1,200 cu. yd. per hour. The wash water is furnished against a 60-ft. head by an Ingersoll-Rand Cameron 10-in. centrifugal pump driven by a 200-hp. motor.

All of the wash water and waste goes to a concrete sump in the basement of the building from which it is handled by an 8-in. Morris centrifugal pump to a large settling basin about $\frac{1}{2}$ mi. from the plant. Space was left and foundations are in place for two additional pumps when these become necessary. A small boiler supplies steam for heating this building in cold weather.

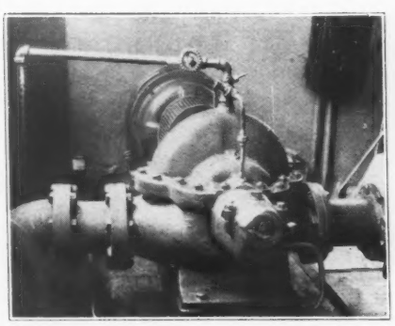
The washed stone feeds from the washer onto Conveyor G. This is a 48-in. horizontal belt conveyor on 104-ft. centers and is driven through a Falk herringbone gear reducer by a 20-hp. motor. This conveyor is reversible and feeds at one end to Conveyor H to the car- and truck-loading building



The pump which furnishes water for the stone washer.

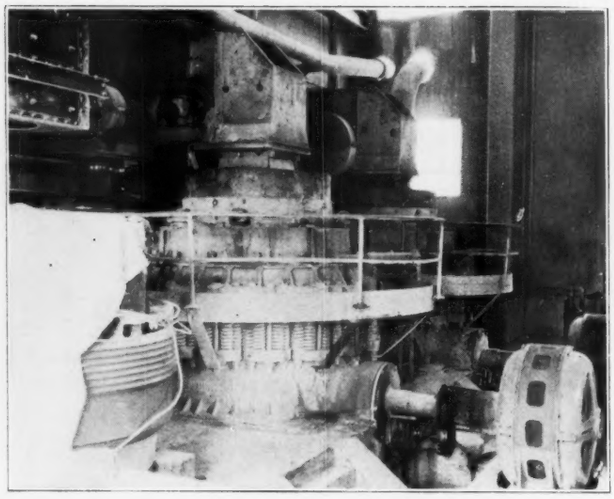


The sand pump which handles refuse from washer.



The pump which furnishes water for steam shovels.

Drag-line stripping overburden. Well drill in the quarry and plant in background.



The two cone secondary crushers and their feeders. Feeder for future third crusher at left.

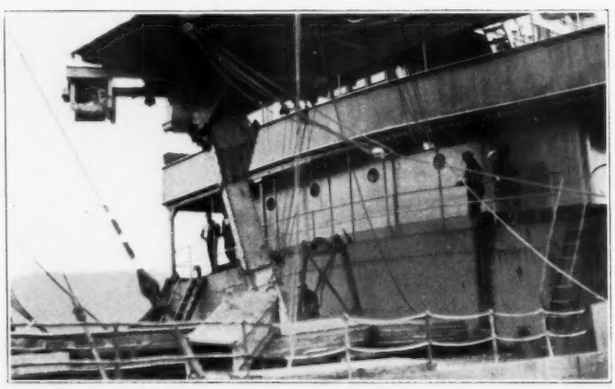
and at the other end to Conveyor J for barge and boat loading. When it is desired to load unwashed stone it is chuted from the bin above the washer by passing this and discharging directly onto Conveyor G and to either of the loading plants.

Conveyor J is 48 in. wide and on 108-ft. centers and is driven through a Falk right-angle reducer by a 100-hp. motor. This conveyor is inclined until it reaches the dock where it extends horizontally out over the river on a structural-steel framework. Loading into boats or barges is done through revolving steel spouts. These, together with a Robins tripper on the conveyor, permit trimming of the barges, so that the load is evenly distributed. A Lambert electric hoist is used for spotting the barges while the larger vessels use their own winches for this purpose.

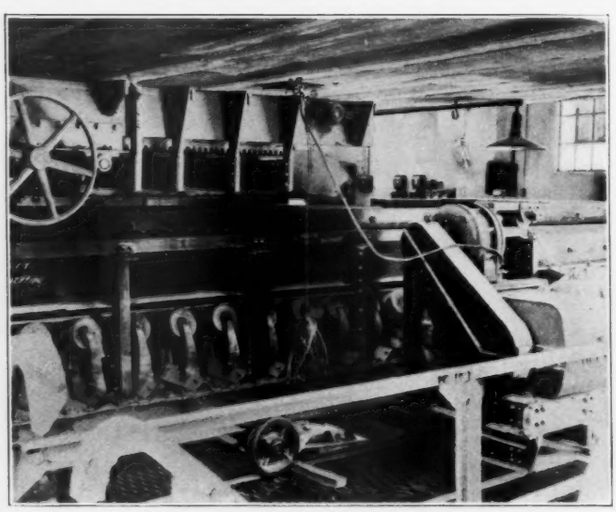
Car and Truck Loading

Conveyor G from the washer building discharges at its other end in a small building called the Junction House onto inclined conveyor H to the car- and truck-loading building. This conveyor is 42 in. wide and on 316-ft. centers and is driven through a tandem drive by two 75-hp. motors and Falk herringbone reducers.

Building No. 6, like the screening building, is of concrete and is mounted on 8 concrete storage silos in a single row. It is 15 ft. wide by 120 ft. long and is parallel to and immediately west of the right-of-way of the New York Central Railroad. Conveyor G discharges through a split chute either directly into the first silo or onto horizontal belt con-



Close-up view of loading system showing chute discharging to hold of boat.



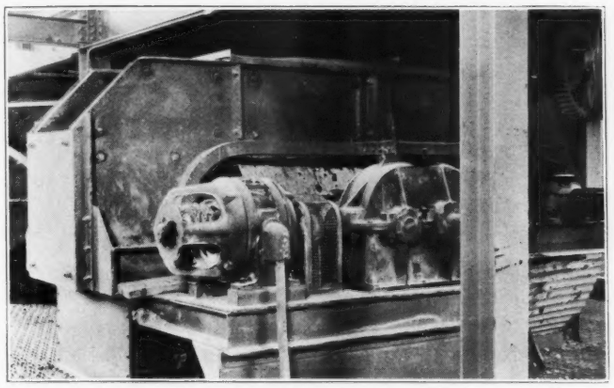
The variable-speed feeder in place for future secondary crusher.

veyor I to the other seven silos. Conveyor I is 36 in. wide and on 176-ft. centers and is driven by a 30-hp. motor through a Falk right-angle reducer. A Robins traveling tripper of the pant-leg type travels on rails over this conveyor and discharges through openings in the tops of the silos on both sides of the conveyor.

Each of the eight silos is 20 ft. in diameter by 60 ft. high and they have a total capacity of 3,500 cu. yd. They receive grades of stone corresponding with those in the large silos in building No. 4 ranging in size from 2½-in. down to ⅜-in. Stone is loaded out through side arc-type drop-chute gates into trucks on the west side of the silos and into railroad cars on a siding on the east side. A small building at the north end of the silos houses a 20-ton Howe truck scale for weighing out shipments. A 100-ton track scale is also provided for. Spotting

and switching of cars is done by a Vulcan 20-ton, 6-cylinder gasoline locomotive. A concrete tunnel extends underneath the silos for their full length and will be used in case it becomes necessary to prepare mixed grades of stone in the future. No handling equipment has yet been installed in this tunnel but provisions are made for gates and chutes and for a mixing and loading conveyor.

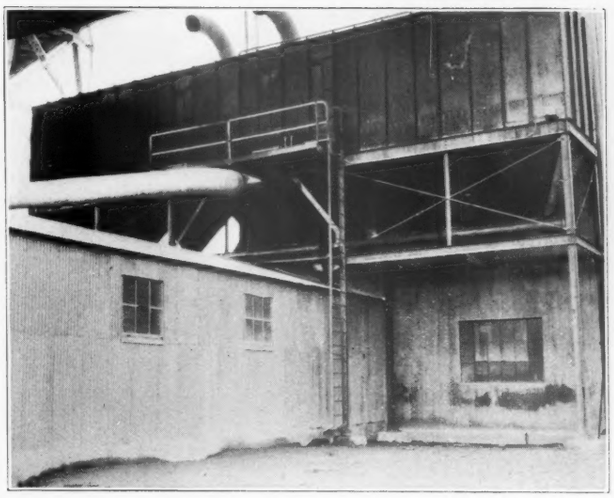
The great bulk of the stone produced at this plant is shipped in boats and scows to New York City and other points nearby. Large shipments have also been made in ocean steamers to large construction and road-paving jobs along the Atlantic Coast. Some shipping is done by rail to points not accessible by water and a comparatively small percentage of the shipments are by truck to Poughkeepsie and other points in the vicinity of the plant.



One of the feeders in the screening building.

Building No. 7

Building No. 7 contains the plant office, wash room, storerooms, machine and blacksmith shops, compressor room, and electrical shop. The wash room is at the north end of the building and above it on the second floor is the office. The machine and blacksmith shops and storeroom are in a row and are served by a 10-ton P & H traveling crane. The storeroom contains a large stock of tools and repair parts and the shops are completely equipped to do any kind of repair work. A railroad siding runs into the shops to facilitate unloading of heavy machinery and for storage of the gasoline locomotive.



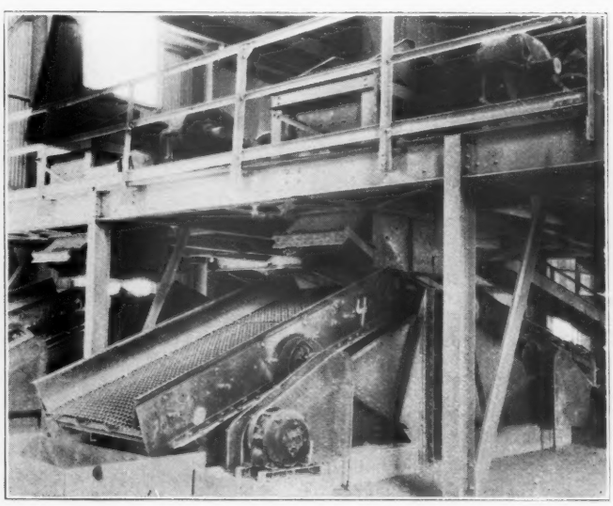
The dust collector for the secondary-crusher building.

The compressor room contains an Ingersoll-Rand 14-in. by 22-in. by 16-in. Class PRE2 air compressor driven by a 264-hp. General Electric synchronous motor. This compressor furnishes air for the jackhammer drills and drill sharpeners and has a Reed air filter on its intake. A De Laval 6-in. centrifugal pump driven by a 40-hp. General Electric motor furnishes water for the steam shovels in the quarry. Adjoining the compressor room are the electric storeroom, the electric shop and the switch room. The entire building is heated by unit heaters. The buildings includes an office and a general plant office. The switchboard located here handles all outside calls and connects up the various departments of the plant.

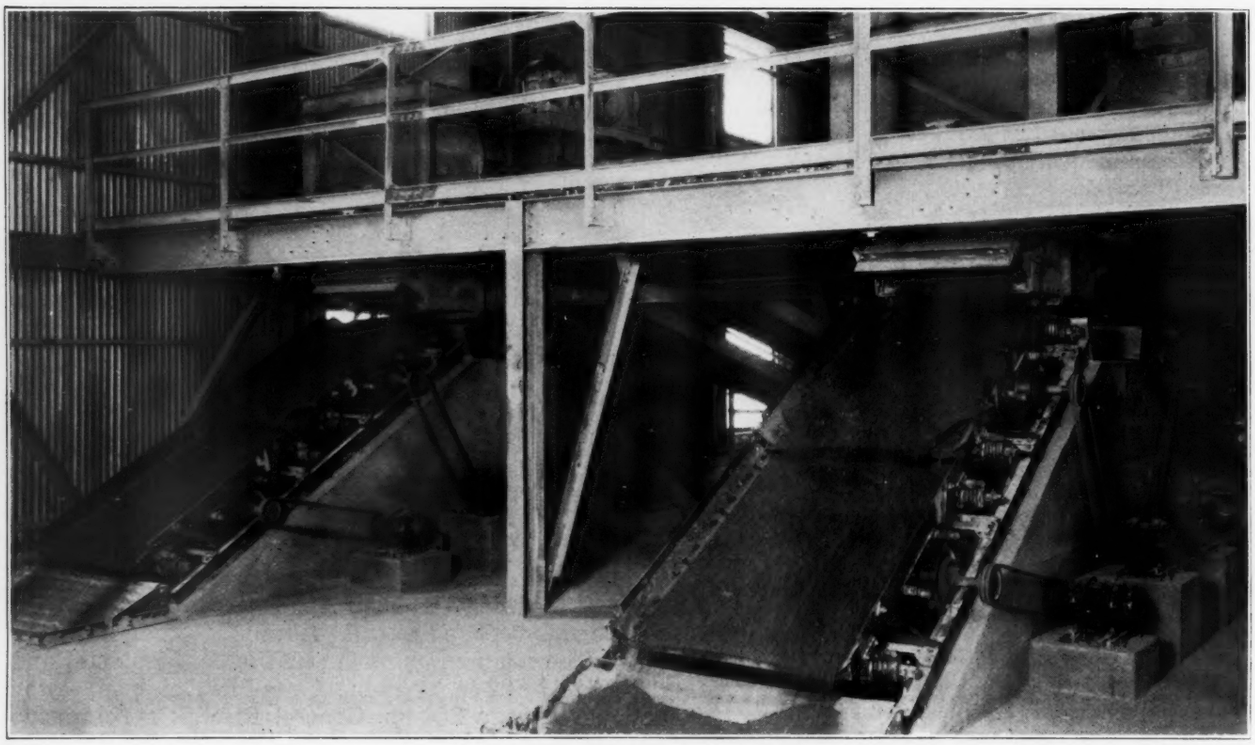
The Electrical Features

The electrical power, lighting and signalling systems in this plant are in themselves worthy of a separate detailed descriptive article. However, in presenting a brief description covering the most important features, the writer is indebted to

Bin gates and belt conveyor in recovery tunnel under main storage silos.



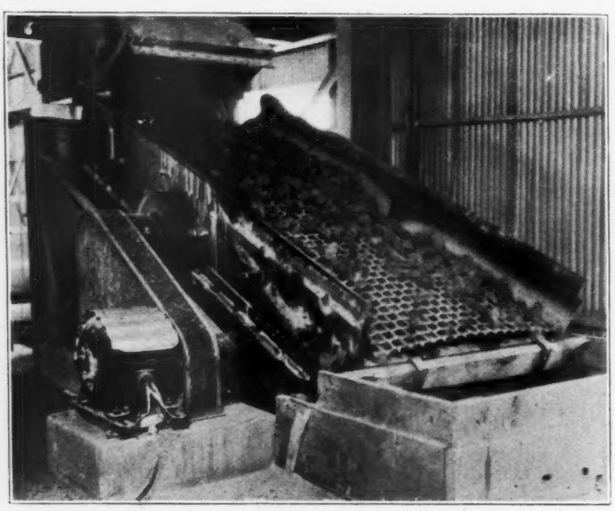
One set of four coarse sizing screens with their feed conveyors and drives above.



One set of eight fine sizing screens with their two feed-conveyor drives above.

L. F. Miller, electrical engineer for the New York Trap Rock Corp. Mr. Miller made the entire electrical layout and all equipment and wiring was installed under his supervision.

The electric power for the plant is furnished by the Central Hudson Gas & Electric Corp., at 66,000 volts, 3-phase, 60-cycle. The power lines are attached to the substation and from that point all equipment, including the station and transformers were furnished and installed by the New York Trap Rock Corp. Three 1,500-kva., 3-phase power transformers are used to reduce the 66,000-volt current to 2,300 volts for distribution. Each transformer is protected by S. & C. high-potential fuses in addition to the main oil circuit breaker. Switching facilities are provided, so any combination of transformers may be thrown in at any time. Present load conditions only require the operation of two transformers but rather than have any one particular transformer idle at all times, they are alternated and each transformer works two weeks and is idle one week. In this manner, no one transformer is out of service long enough to collect a serious amount of moisture. Oil in all high-voltage equipment is tested every three months and in any case where it breaks at 25,000 volts, filtering is immediately started in a special machine until the oil tests 30,000 volts or better. From the transformers, the power lines are run underground into the transformer switch room where they enter a five-panel switchboard, which includes three transformer panels, one for totalizing and one feeder circuit for an air compressor. All panels have recording instruments so a graphic record of load conditions and voltage may be had at any time. The main feeders are run from this room to the distribution switchboard which is located on the top floor of building No. 2. This switchboard consists of 24 panels, which include eight spares for future use. Each spare panel is drilled and wired so that, when it is needed for service, it will only be necessary to attach and connect the breaker, relays and meter. Each spare circuit also has the conduit run from the board to a point where it will be available at any time. A very interesting thing to note on this board is that all circuits except conveyors have recording meters which is a very important factor in the successful operation of a plant of this kind. These meters are watched very carefully and any variation of load conditions is readily noted.



A close-up view of one of the vibrating screens in operation.

The total connected load is 4,500 hp. divided as follows: crusher 650 hp., conveyors 1,600 hp., shovel 175 hp., well drills 165 hp., screens 240 hp.,

pumps 400 hp., air compressor 300 hp. The remainder includes motors used on cranes, hoists, feeders and other miscellaneous equipment. The general practice of this company is that all motors are 440 volts up to and including 25 hp. Above this size, 2,200-volt motors are used. All low-voltage equipment is thrown directly on the line with automatic, push-button starters but on the larger sizes, either compensators or controllers are used. This applies to all except the motors used on the Symons crushers which are Allis-Chalmers super-synchronous 200 hp. They are thrown across the line producing a starting torque of 300 per cent.

A very interesting feature is the method of control used on the tandem drive for conveyors. As outlined elsewhere, two separate motors are used in connection with two speed reducers. To protect each motor a separate oil circuit breaker with overload relays is provided for each motor, these breakers being left closed. Another breaker with under-voltage release is installed ahead of the two motor breakers. In starting the motors the main breaker is closed and the motors start to rotate. The operator starts moving the controller handle, bringing the motors up to speed at the same time because the one handle operates two controllers, which are connected by means of a shaft and gear. Tandem drives are used on conveyors A, B, D, E, F and I.

A complete interlock and signal system is installed to prevent the large flow of material piling up at some particular point in event something stops. The system used is to connect the control circuit of each starter to the leads of the motor directly following. For instance, conveyor E must be running before D can be started and if E stops, that will open the control circuit on D, and so on, down the line until everything behind E will stop. All motors are interlocked and stop simultaneously from the source of trouble back to the Symons crushers, but these crushers, as well as the primary, continue to run as there is ample storage space for the stone that is in the crusher. However, as soon as the interlock operates, the crusher feeders and hoists are locked out and no more stone can be fed in until the trouble is cleared and the belts running. In event any crusher stops, its feeder goes out at the same time. This also applies to all screens which have feeders to deliver their load. In every case a test switch is installed so any motor can be started for test purposes or trying the machine. As soon as any piece of equipment stops a red light comes on and operation cannot be resumed until this light goes out and the white light comes on. No relays are used in the interlock or signal system because their parts are so easily affected by the dust. Instead heavy duty contactors are used throughout and so far there has not been a single failure or any trouble whatever.

A telephone is located in every building for outside communication, while there is an inter-communication system between the dock and all buildings pertaining to the loading. During the construction of this plant, much thought was devoted to the lighting of the buildings and quarry. All buildings are lighted inside by means of ceiling reflectors while the outside grounds and quarry are lighted with large reflectors and flood lights. Each conveyor has a row of lights over the center of the belt giving a very even distribution of illumination.

The method by which the electrical equipment is kept in good order is also an important feature. Each piece of equipment is regularly inspected and, if necessary, is immediately repaired. A large supply of spare parts is carried in the electrical storeroom and all electrical repair work including motor winding is done in the electric repair shop which is completely equipped for this purpose. Both of these rooms are in building No. 7. Appleton Electric Co. threadless conduit and Cutler-Hammer controllers are used throughout the plant.

The Robins Conveying Belt Co. furnished all of the conveyor idlers, pulleys and take-ups for the entire plant as well as the conveyor belting and the Gyrex and Vibrex sizing screens. All conveyors have troughing idlers, the 48-in. conveyor having the 5-pulley type and all others the 3-pulley type. Rubber covers are used on all idlers located under loading points and all of the longer conveyors have vertical gravity take-up pulleys. All idlers have Timken bearings.

Falk speed reducers are used on all conveyor drives. Both the regular herringbone and the bevel gear right-angle type are used. Conveyors A, B, D, E, F and F-1 have tandem drives due to their extreme length. These drives differ from the ordinary tandem drive in that each of the tandem pulleys is driven through an individual motor and speed reducer. This method was worked out by the New York Trap Rock Corp.'s engineers after considerable experimentation in its other plants. This type of tandem drive practically eliminates slippage and consequent wear of the conveyor belt due to the play in the gears of the customary tandem drive. A description of the electrical control of these drives is given elsewhere in this article.

All of the motors except those driving the air compressor, the primary crusher and the small water pump were furnished by the Allis-Chalmers Mfg. Co. A total of 161 electric motors with a total of 4,056 hp. are used in this plant. About 65 per cent of the total horsepower is required to operate all departments of the plant at its present full capacity. This company also furnished the Texrope drives for the vibrating screens.

Officers

The main office of the New York Trap Rock Corp. is at 250 Park Ave., New York City, and the engineering offices are at 252 Water St., Newburgh, N. Y. In addition to the new plant at Clinton Point, the company also operates plants at Cedar Cliff, Haverstraw, Tomkins Cove and Verplancks, all in New York State and on the Hudson River. Officers of the company are: Mortimer D. Wandell, president; Sterling Tomkins, vice-president; N. D. Lancaster, vice-president; Walter Jones, Jr., secretary-treasurer; E. Lee Heidenreich, Jr., general superintendent and chief engineer. L. F. Miller is electrical engineer for all plants. Raymond Coy is superintendent of the Clinton Point plant.

Dredge with clamshell crane operating on bank at the plant of Canadian Aggregates, Ltd.

Sand-and-Gravel Industry's Advancement Reflected in Plant Development

IN spite of the unfavorable business conditions that prevailed in most industries during the past year and which resulted in the curtailment of expenditures and the postponement of improvements and expansion, the sand-and-gravel industry in general again had a fairly prosperous year. The number and quality of new plants put into operation and the extent of the enlargement and improvements made in existing plants reached a total that will compare favorably with that of any preceding year. Although the amount of construction work, which is one of the main outlets for the sand-and-gravel industry, showed a marked decrease from the preceding year, the amount of road work done in all parts of the country almost made up for this deficiency.

As usual PIT AND QUARRY has kept its readers informed of all new developments as they occurred, whether they were advances in technology, equipment or design. Stories were published describing in detail practically every plant improvement of consequence, including not only the larger plants but the progressive small plants as well. In the review of plants published below a number of representative large and small plants, incorporating some of the most advanced features of design, are described.

Locomotive and cars being loaded at the Canadian plant. Screening building at right.

Front view of Canadian aggregates dredge with nozzle raised

Canadian Aggregates, Ltd.

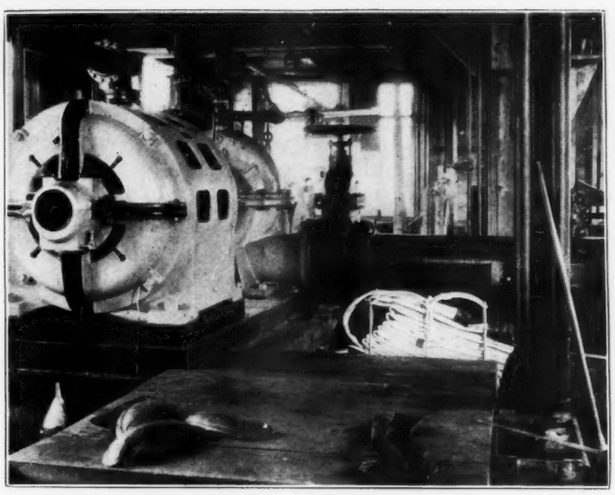
A new plant combining the features of unusual design and large capacity was erected by Canadian Aggregates, Ltd., at Burford, Ont., Canada, about 30 miles southwest of Hamilton. Actual construction was started late in February and the plant was in full operation August 16. It has an ultimate capacity of 500 tons per hr.

Perhaps the most interesting feature of this new operation is the hydraulic dredge which uses the Ward system. This system of dredging is still

viewed skeptically by many operators in the industry, but conclusive proof is available that, given the right kind of deposit, it will operate with efficiency and economy.

The dredge is of all-timber construction with a hull 30 ft. wide by 60 ft. long containing four watertight compartments. A well 12 ft. wide by 15 ft. deep at the front end gives space for the intake. Two 40-ft. tapered, steel-pointed spuds 18-in. square at the stern of the dredge hold it in place. Two swinging lines hold the bow end. The Ward unit intake has a structural-steel framework and is supported from a timber A-frame which is permanently fastened at a slope of about 45 deg. by cables from the corners of the dredge superstructure.

The main dredge pump at the rear of the dredge is a Morris Style HC 15-in. centrifugal, of the end-



The 300-hp. motor driving jet pump on dredge at Canadian Aggregates plant.

intake, bottom-discharge type, with renewable manganese-steel liners. The pump is driven through a Falk spring-type flexible coupling by a Westinghouse 750-hp. Type H. W. induction motor with a top speed of 490 r.p.m. under full load.

Near the dredge pump at the rear of the dredge is the DeLaval 5-in. centrifugal pump which serves for priming. This is driven by a Westinghouse 50-hp. motor and has a capacity of 700 gal. per min. (U. S.) against a head of 160 ft. at 1,450 r.p.m. It is primed from a tank above the dredge and, in turn, primes the jet pump.

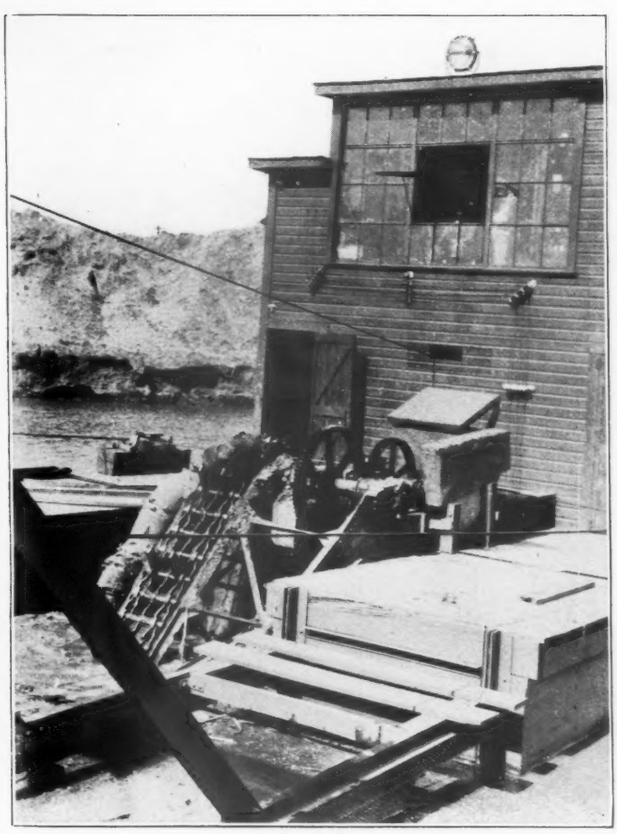
The jet pump is a Moore Steam Turbine Co. centrifugal, with a 14-in. suction and a 12-in. discharge. This has a capacity of 6,200 gal. per min. at 160-ft. head and 1,500 r.p.m., and is driven through a Moore flexible coupling by a Crocker-Wheeler 300-hp. motor. This is really the main pump in the Ward system of dredging, as it furnishes the suction which feeds the gravel to the booster pump. Its other functions are to prime the dredge pump and to operate the hydraulicking jet which caves down the bank. This jet is fed through a 2-in. line and has a ¾-in. nozzle. The jet pump line is tapped into the intake line of the service pump so that, in an emergency, either could function for the other.

The dredge pipe line to the dewatering hopper at

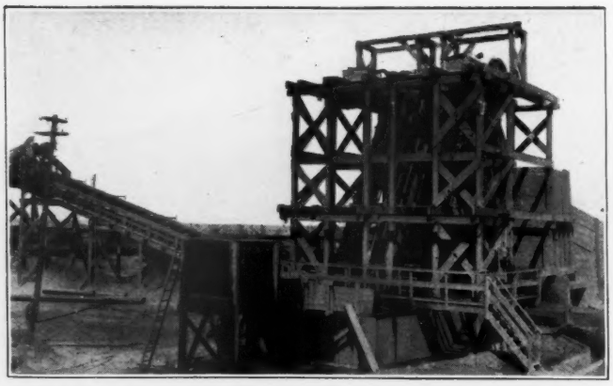
Scalping screen building at Canadian Aggregates plant. Dewatering box at right.

the plant is about 700 ft. long and the head is about 40 ft. It runs horizontally over the top of the four-compartment dewatering box where the end of the pipe line is welded shut. Two sliding gates over each compartment control the feed from the pipe. Two compartments are always being loaded while the other two are feeding to the plant.

The box is of timber construction braced with steel rods on a concrete foundation. Each of the four compartments has a capacity of 125 cu. yd. and has eighteen 10-in.-square openings in its sides covered with ½-in.-mesh screen cloth to permit drainage. This water and any other drippage from the bins drain from the concrete floor under the box through flumes back into the dredge pond. The



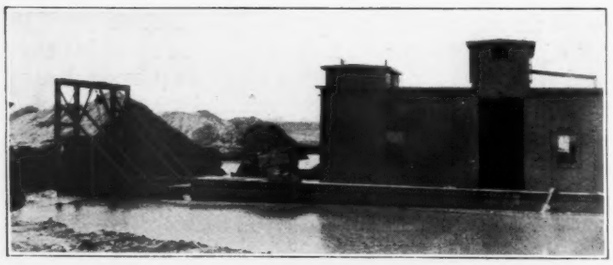
Cutter head on Missouri Gravel Co. dredge bringing up mass of compact clay.



Dredge-pipe discharge box and elevators from dewatering boxes at Missouri Gravel Co. plant.

overflow from the top goes through a wooden flume into the pond. A steel partition between compartments protects a drained compartment from the water in an adjoining compartment which is being filled.

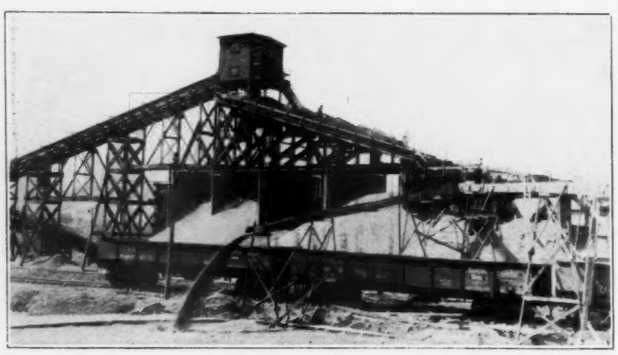
Each compartment discharges through two Link-Belt arc gates onto the 36-in. conveyor (No. 1) to the scalping screen. This conveyor runs horizontally under the dewatering box for 50 ft. and is then



Dredge at the Missouri gravel plant.

inclined to the top of the scalper building. It discharges over a sloping rail grizzly 8 ft. long with 1½-in. spacing. The coarse aggregate discharges into the Link-Belt 5-ft. by 24-ft. revolving scalping screen which has 2-in.-mesh wire cloth. The coarse material from the scalper drops through a chute into a surge-bin feeding an Iowa Mfg. Co. 9-in. by 36-in. jaw crusher. This discharges onto a 16-in. belt conveyor (No. 5) which feeds back onto belt conveyor No. 1 to the scalping screen.

The fines from the grizzly and from the scalping screen discharge onto a 36-in. belt conveyor (No. 2) to the screening building.



Open-end bins below conical screens at Missouri plant.

Conveyor No. 2 discharges into a chute where wash water is added. The material then passes over ¼-in. perforated plates to remove some of the sand and through a split chute feeding the first pair of sizing screens. Seven single-deck Hum-mer double vibrating screens size all the material.

The seven-compartment bin storage has a live storage capacity of about 1,400 tons. At present each bin is walled on both sides with the timber but changes are to be made to enlarge the capacity. All chutes in the plant are covered and are steel-lined except where there is impact. Rubber chute lining is used at these points.

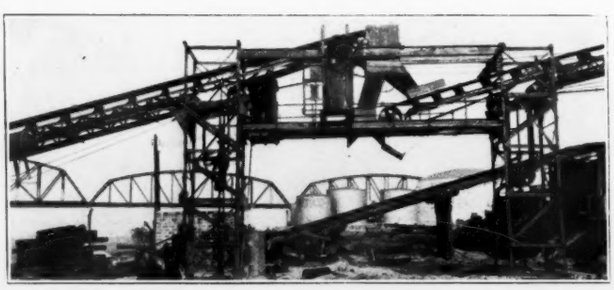
The bins discharge through gates onto a 36-in. belt conveyor (No. 3) in a concrete tunnel beneath. Any desired mixture of sizes can be made here. The conveyor is slightly inclined for 90 ft. in the tunnel and then slopes more steeply for the remaining 100 ft. of its length to the loading building.

This conveyor discharges through a perforated chute onto a Link-Belt 36-in. horizontal shuttle belt conveyor over the loading track. This is on 40-ft. centers and allows a car to be loaded evenly without being moved. A Plymouth 24-ton gasoline locomotive spots the cars and does all switching in the yards. The cars are weighed on a Fairbanks 120-ton-capacity track scale.

A complete description of this plant was published in PIT AND QUARRY, Nov. 19, 1930.

Missouri Gravel Co.

The new plant of the Missouri Gravel Co., of La Grange, Mo., is not only an example of superior plant engineering, but it is distinguished by its excellently designed dredge. Built of steel, the hull is 97 ft. long and 30 ft. wide, and consists of three longitudinal sections, each section being divided into two water-tight compartments. The center section



Car-loading bridge at Nugent plant. Note pant-leg chute.

is 10 ft. shorter than the other two, forming a shallow well for the dredge ladder and suction pipe. The dredge superstructure is of wood-frame construction with a small pent-house room providing space for the power transformers and resistance coils. The operator is provided with a pilot house from which he can observe the progress of the operations.

A Diamond 12-in. centrifugal pump forms the central unit of the mechanical equipment. It is of the manganese-steel, side-intake, bottom-discharge type and is driven, through a flexible coupling, by an Allis-Chalmers 300-hp. variable-speed induction motor. For priming purposes, a Chicago Pump Co. 3-in. cen-

trifugal pump is installed nearby. This pump, in turn, is primed by a small barrel of water mounted overhead. The suction pipe of the Diamond pump extends directly to the Diamond 35-ft. ladder-type cutter-head. A structural-steel framework, spanning two steel pontoons which are hinged to the dredge hull, supports the intake end of the ladder, while the top end is supported by the dredge hull. The cutter-head is driven by means of a 25-hp. motor through an open-gear drive.

The position of the dredge and the depth of the cutting-head intake are controlled by a Clyde 3-drum hoist. All of the controls for the hoist, cutter-head, pump and miscellaneous equipment are grouped together within convenient reach of the operator.

While the suction pipe of the pump is relatively straight, the discharge, from the rear of the dredge, has one long-sweep elbow in its line. At the shore end of the line, the dredged sludge is sent to two steel dewatering tanks equipped with Link-Belt dewatering elevators. These elevators take the material from the tanks, discharging it into a large concrete hopper. This hopper, which is 40 ft. long, 8 ft. wide and 10 ft. deep, feeds the main plant elevator leading to the screens. It is made large enough, purposely, to provide a reserve capacity so that any temporary delay in the flow of sludge from the dredge will not cause a fluctuation in the supply to the screening equipment.

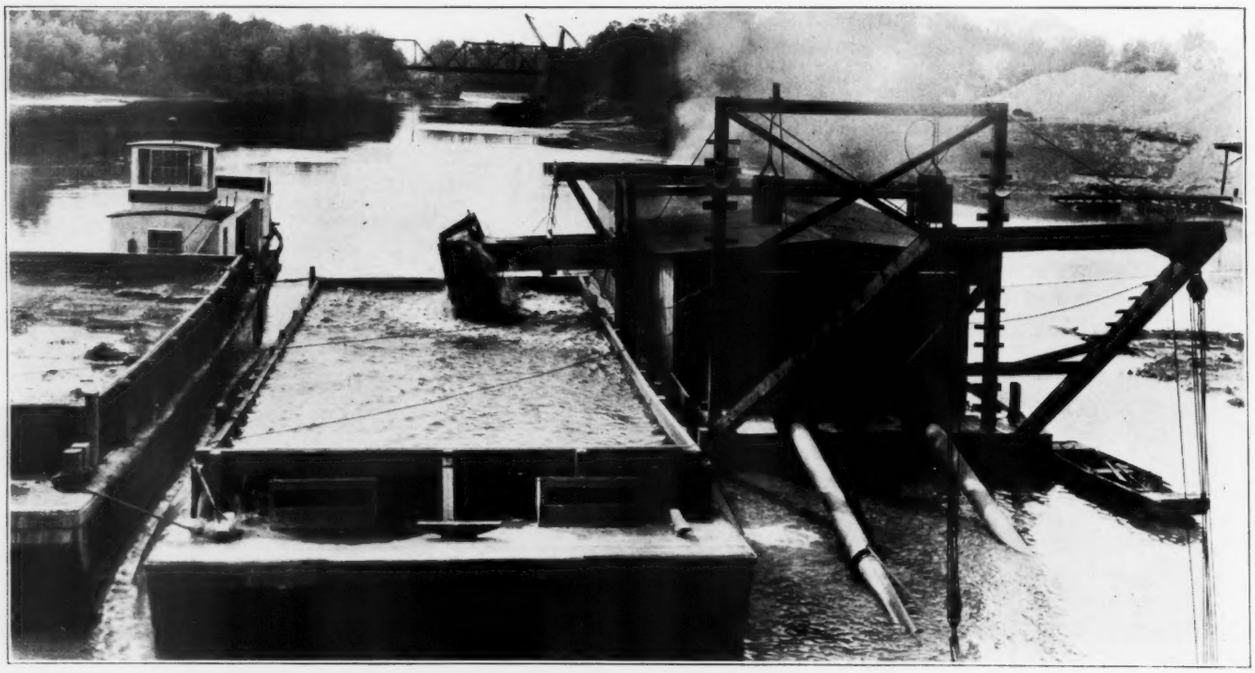
Two sets of four Link-Belt Dull conical screens classify and wash the material into 5 sizes. All oversize material is either wasted or sent to a McCully gyratory crusher for reduction.

The conveyor structure and storage bin.

Six bins of the open-end type are used for the storage of materials. A concrete tunnel, passing beneath the bins, has access to about 50 per cent of the stored material. A system of two conveyors, the first of which is installed in the tunnel, transports the desired size or any proportion of sizes of this material to a Blaw-Knox circular hopper which, in turn, loads the empty cars beneath.

Car-spotting is expedited by the use of a Caterpillar tractor. The combination of a loading hopper and tractor is considered a great advantage by the plant superintendent because the hopper allows the

The Nugent plant from the river barge. Floating dock in foreground. Loading bin at right in background.



Tug with empty barge at left. Center barge being unloaded. Note two intakes on dredge. Denton Sand & Gravel Co.

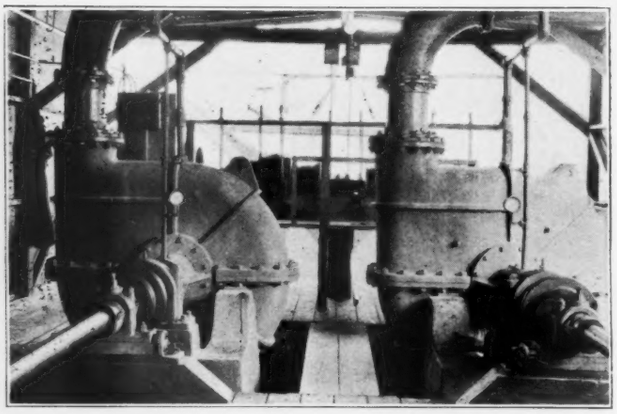
cars to be moved without stopping operations, and the tractor permits rapid movement of the cars. In addition to this duty, the tractor is used for general utility purposes about the plant.

For a complete, illustrated story of this plant, see PIT AND QUARRY, June 4, 1930, page 31.

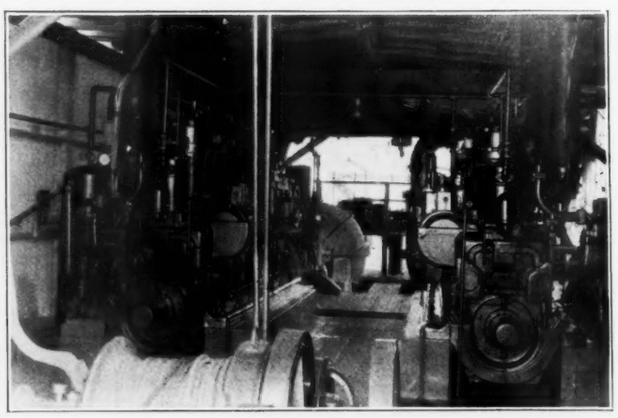
Nugent Sand Co.

One of the finest contributions to materials-handling engineering in 1930 was made by the Nugent Sand Co., of Louisville, Ky., in the design of their new barge-unloading conveyor system and storage bins. The new conveyor system replaces the car-and-hoist method formerly used to unload the company's river barges. Essentially it consists of a floating dock anchored by spuds which permit it to rise and fall with the change of the river stages. Upon this dock, a hopper is mounted, which is used to feed the first conveyor unit. The *Rescue No. 3* of the Nugent company, which is a derrick boat, is coupled against the floating dock. It is equipped with a steam-operated clamshell bucket, and unloads gravel from the barges tied alongside, into the conveyor hopper. Four conveyors in series handle the material from the hopper to the final bins and storage yards.

The first conveyor in the series extends from the hopper to a pier at the shore, resting on a Moran flexible ball joint below the hopper. By the use of the Moran joint, the conveyor adjusts itself according to the movement of the floating dock. The outboard end is on a steel tower at the river bank which is mounted on a concrete pier resting on nine 36-ft. piles.



Two 12-in. dredge pumps and 4-drum hoist operating nozzles in background. Denton Sand & Gravel Co.



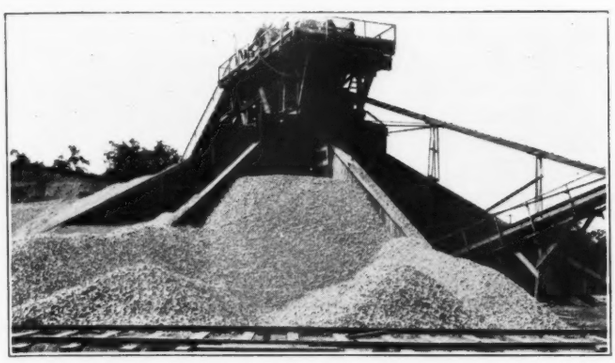
Two 210-hp. Diesel engines operating pair of 12-in. dredge pumps at the Denton plant.

A second conveyor receives its material from the first one at the pier, transporting it to the carloading bridge where the material is discharged into a bifurcated chute which permits it to flow either into the railroad cars beneath for shipping or to another conveyor which transports it to the storage bins.

The latter conveyor extends from the carloading bridge to the bin structure, continuing along the top

of the structure for its full length. It is equipped with a specially-designed Webster tripper which distributes the materials to bins on either side and is high enough to load the shuttle conveyor. The shuttle conveyor spans the storage bins traveling on rails placed on the two sides of the storage bins. The bed of the shuttle conveyor is 80 ft. long; and the movable frame is mounted on roller-bearing car wheels, permitting it to extend 29 ft. over the yard stock-piles.

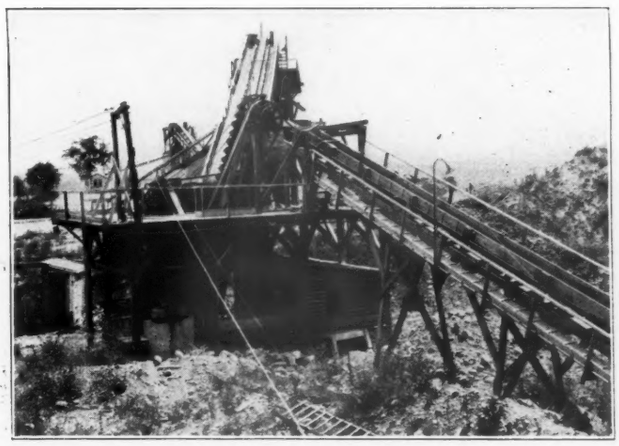
One of the interesting features of the conveyor system is the fact that all of the conveyor parts are interchangeable. The motor powering the first two conveyors in the series is of the same size as the motor driving the long conveyor from the carloading bridge to the bin structure. The drive mechanisms of the head shafts are also interchangeable, as well as all the pulleys, idlers and return rollers. On



Stock-piles about the tower at the Hillside operation.

actual test, a 25-hp. motor, which powers the first two conveyors, was carrying but a 12.5-hp. load with the conveyor carrying its maximum capacity.

The storage bin structure is probably the finest of its kind anywhere. It is built of steel-framing, 50 ft. wide by 150 ft. long providing capacity for 15,000 tons of materials in 6 compartments. The weight of the sand and gravel is carried by three interior and two exterior beams all extending the



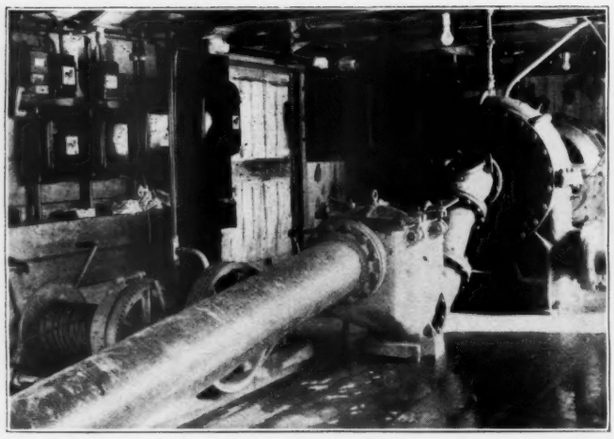
Scalping screen, crusher and bucket elevator at the Hillside plant.

full length of the bin. The three interior beams are 30-in. I-beams, and the two exterior beams are 24-in. I-beams. The load on each beam length is carried by three columns, i.e., the two end columns and a short column in the center. Interior columns are 10-in. by 10-in. H sections. Columns on the exterior, with the exception of the ends and the four corners, are all 9-in. by 10-in. H sections. The four corner columns, which are 8-in. by 10-in. H sections, extend to the full height of the bin, being 30 ft. high above the footing. Three columns in each end are 8-in. by 10-in. H sections, 33.5 lb. per ft., and are also 29 ft. high above the footings.

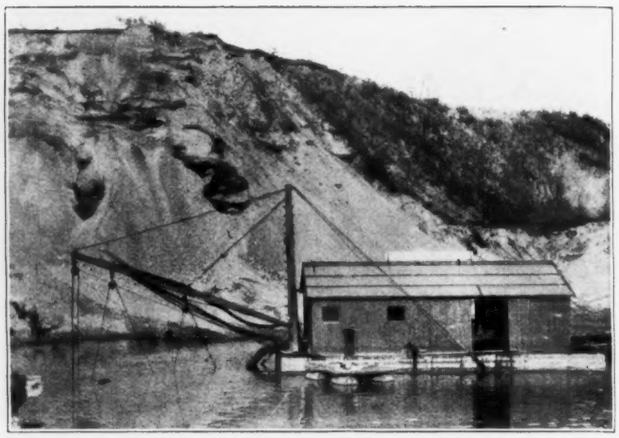
Above the heavy longitudinal beams are mounted the I-beam joists which carry the floor load. They are 18-in. I-sections, weighing 47 lb. per ft., cut 50 ft. long and spaced on 3-ft. 1-in. centers. A reinforced concrete slab 6½ in. thick, covering the entire area over the joists, is the floor of the bin.

The walls of the bin are also built of I-beam sections with removable 3-in. plank panels. On the sides of the bin, 10-in. I-beams, 21 lb. per ft., 20 ft. long, are spaced 6 ft. 2 in. on centers resting on joist beams; the ends are also 10-in. I-beams, spaced 6 ft. 3 in. on centers.

Tower system and truckloading hopper at Hillside plant. Circular track at right.



The 8-in. dredge pump and stone trap at the Albany plant.



Close-up view of the dredge and bank at Albany gravel plant.

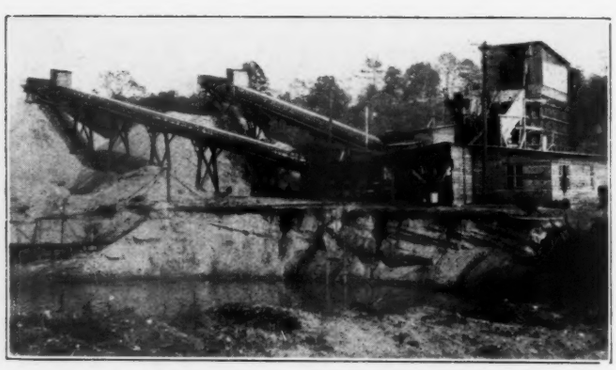
The top of the bin is open, but well braced, and has supports provided for the conveyor understructure and tripper track. The four walls are each capped with lengths of 12-in. channel sections, 25 lb. per ft. Six separate material bins are partitioned from each other by I-beam frame plank walls capped with a 12-in. channel section of the same weight. There are two 7-in. I-beams with gusset plates across the top of each bin, bracing the top in addition to the channel partition caps.

All structural material in the storage bin was furnished by the Bethlehem Steel Co.

The operating features of the bin are many. There being four truck lanes passing through it, trucks can enter and leave rapidly. A truck can be loaded in eight seconds upon arriving at the bin. As many trucks can be loaded as can possibly enter and leave the company's yards, because of the facility provided by one hundred and sixty 12-in. by 12-in. radial dumping gates, which were designed by the Nugent brothers and cast at a local foundry. The gates are lever-operated from an extended square shaft equipped with a sleeve bearing.

The storage bin structure and the four conveyors were not only designed by the Nugent company officials, but the entire fabrication and erection of all the steel work was done at the plant by the company's men.

For a complete story on this plant see PIT AND QUARRY, Dec. 5, 1930. "New Conveyor System and Storage Bins Cut Material Handling Costs."



Albany plant from west showing stock-piling conveyors.

Denton Sand & Gravel Co.

Internal-combustion engine-driven dredge pumps are quite commonly used among American plants. However, a dredge with two 12-in. pumps, each with its own suction pipe and driven by a Diesel engine, is somewhat unusual and its installation at Pacific, Mo., by the Denton Sand & Gravel Co., created considerable interest.

This new dredge has a wooden hull and is 100 ft. long by 24 ft. wide. Its superstructure also is of wood, with siding and roofing of corrugated metal, and extends almost the full length of the hull. The two Morris 12-in. dredge pumps are located side-by-side near the front of the dredge. They have a 14-in. suction and a 12-in. discharge. A 4-drum Samson hoist at the front end of the dredge handles the two 40-ft. nozzles which are supported from a stationary timber boom. The hoist is driven through a Texrope drive by a 20-hp. Fairbanks-Morse electric motor.

The dredge pumps are direct-driven by two Fairbanks-Morse marine-type, Model 35, full-Diesel, 6-cyl., 210-hp. engines operating at 360 r.p.m. These are located side by side slightly to the rear of the center of the dredge. Each engine has a Cutler-Hammer magnetic clutch, the current for which is generated by a Fairbanks-Morse d.c. generator driven through Texrope drive from the drive shaft. All electric motors on the dredge are direct-current and secure their power from the same source. Each cylinder of the motors has an exhaust pipe running through the roof of the dredge, and both engines are equipped with Brown exhaust-temperature indicators.

A Fairbanks-Morse 5-in. centrifugal pump driven by a 15-hp. electric motor primes the dredge pumps and can serve also as a fire and bilge pump. A Samson 2-drum hoist at the rear of the dredge operates a shore line and a barge line. This hoist is gear-driven by a 15-hp. motor. Air is stored in three tanks and is furnished by air pumps that are integral with each of the Diesel engines. A small 1-cyl. gasoline-driven air compressor is used as an auxiliary. Fuel for the engines is stored in two 750-gal.-capacity tanks at the rear of the dredge.

The dredge has two operators—one man to attend the Diesel engines and one man to handle the barges

that are being loaded. The pumps discharge through the side of the dredge into a flume with a baffle at the end which causes the material to drop vertically into the barges. Two small hand hoists on the dredge handle the flume and the front end of the barge. A 200-ton-capacity barge can be loaded in 30 minutes under average conditions.

All the equipment on the dredge, with very few exceptions, was furnished by Fairbanks, Morse & Co.

In addition to the dredge, the tug, *Helen-Doris*, used to push barges to the plant, was placed in service. The *Helen-Doris* is of steel construction, and is powered by a Diesel engine, this one being a 75-hp. unit. Its drive-shaft extends to a Keck-Gonnerman enclosed spiral-bevel-gear drive, at the rear of the boat, which powers the 12-ft. stern paddle-wheel through two wedge-type friction clutches.

Complete details of the dredge, the tug equipment and the plant were published in the July 16, 1930, issue of PIT AND QUARRY in the article entitled "Missouri Sand-and-Gravel Firm Puts New Equipment in Service."

Hillside Sand & Gravel Co.

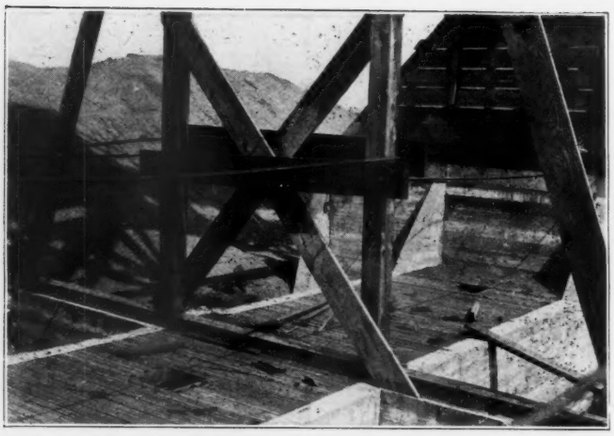
An outstanding development in sand-and-gravel plant stock-piling design was achieved at the new plant of the Hillside Sand & Gravel Co. at Prospect, Wis. The design, known as the tower system of stock-piling, was originated by the Fred T. Kern Co., consulting engineers of Milwaukee, Wis.

Its principal difference in design from the bin-type plant is in the arrangement of stock-piles and washing screens. The production equipment in the pit, scalping screen, crusher, and return circuit conveyor are constructed in the conventional way, but the stock-piles are arranged in a circle, there being seven piles of material, each separated by a partition radiating from an octagonal-shaped tower in the center. The eighth compartment is open, providing space for a belt conveyor. Inside the tower, at the foot of each stock-pile, is a feeder-bin gate, each discharging to the belt conveyor which transports the aggregates to the Butler hopper for truck loading. As four different sizes of aggregates are stocked in seven compartments, it is possible to proportion the delivered aggregates to any specification by merely regulating the flow of material through the feeder-bin gates. Under normal operating conditions the stock-piles will be replenished as fast as shipments deplete them. In the event of a temporarily glutted market or a shortage of trucks, the excess aggregates are scooped from the compartments by means of a Sauerman power drag-scraper which is operated from a power hoist traveling on a circular track extending around five of the partitions, permitting access to every type of material stocked. Enormous stock-piles of material may be built by this method and, as soon as delivery of materials is resumed, the drag-scraper may be reversed, and the stocked materials scraped back into their respective compartments.

Discharge box showing screen and sump at the Automatic gravel plant.

The Telsmith washing screens and sand-settling tanks are located above the tower, mounted on a platform. Each size of material is chuted to its re-

First operating position of dredge of Automatic Gravel Products Co.



Roof of the stock-pile tunnel at the Automatic plant. Note dumping-gate openings.

spective stock-pile. Under the present arrangement, two compartments are used for 2-in. gravel, two for 1-in. gravel, one for pea gravel, and two for sand. The chutes are built to allow alternation of the aggregates from one stock-pile to the stock-pile of the same material on the other side of the tower.

The aggregates are recovered from the stock-piles by means of a belt conveyor located in the open compartment. The conveyor is placed below the feeder-bin gates in the tower and carries the aggregates to the Butler hopper located about 100 ft. from the tower. Four partitions in the hopper provide a small stock of aggregates for the trucks which are loaded beneath. A Butler weighing hopper is used to weigh all aggregates for road construction.

The advantages of the Kern system may be summed up as follows: Shipment of materials is independent of production, therefore neither operation is affected by conditions which curtail one or the other; materials can be proportioned by easy operation of the bin gates inside the tower; sliming of clay balls achieved by the daily use of alternate compartments; saving in initial cost of 15 to 20 per cent because of its inherent economical design; reduction in operating costs because production is not affected by shipment fluctuations and shipping is not delayed due to production troubles.

For the production of the raw material, a Sauerman power drag-scraper is employed. The processing equipment consists of a Telsmith 40-in. by 10-ft. scalping screen, a Telsmith 8-A crusher, and a Telsmith No. 7 sand-settling tank. The Butler 10-cu. yd. truck-loading bin has a two-compartment aggregate batcher mounted beneath the hopper. Allis-Chalmers pumps and motors are standardized equipment at the plant.

A complete story, entitled "Tower System of Stock-Piling Creates Interest in Aggregate Field," was published in the Aug. 27, 1930, issue of PIT AND QUARRY.

Albany Gravel Co.

A quick and economical manner of handling an excessive amount of sand, which is a common condition in many plants, is being used at the Albany Gravel Co., Croton-on-Hudson, N. Y., plant. The deposit averages 85 per cent sand and 15 per cent gravel, and the material is reclaimed by means of a hydraulic dredge. This dredge is equipped with a Morris 8-in. pump and a special stone trap installed on its suction side to prevent large stones from reaching the impeller.

The dredge sludge is relieved of the sand and water immediately upon reaching the discharge box where a ¼-in.-mesh screen is mounted beneath. Sand and water from this screen pass to two Good Roads sand-drag boxes for the production of concrete sand. The overflow enters a third sand box which produces plaster sand. A belt conveyor receives the concrete sand from the drag and transports it to a stock-pile. Another conveyor handles the plaster sand, in a similar manner, to a separate stock-pile. In a tunnel beneath these stock-piles, trucks are easily loaded from bin-gates in the roof.

Coarse materials from the ¼-in. sand screen are sent via a bucket elevator to a Good Roads revolving screen to be classified. Oversize gravel (above 1½-in.) is chuted to a bin which, in turn, feeds a Climax jaw crusher. The large stones, taken from the suction trap of the dredge pump, are also sent to this crusher. A return-circuit conveyor transports the crushed material to the bucket elevator which feeds the revolving screen.

A timber-constructed bin with three compartments is used for gravel storage and loading. Trucks have access to the bins from side-mounted bin gates.

It can be seen that but a few minutes elapse from the time the materials enter the dredge intake until the sized sand is in the stock-piles. The efficiency of the system is indicated by the fact that only four men are required to operate the entire plant. These include the dredge operator, the plant operator, one blacksmith and one man loading trucks.

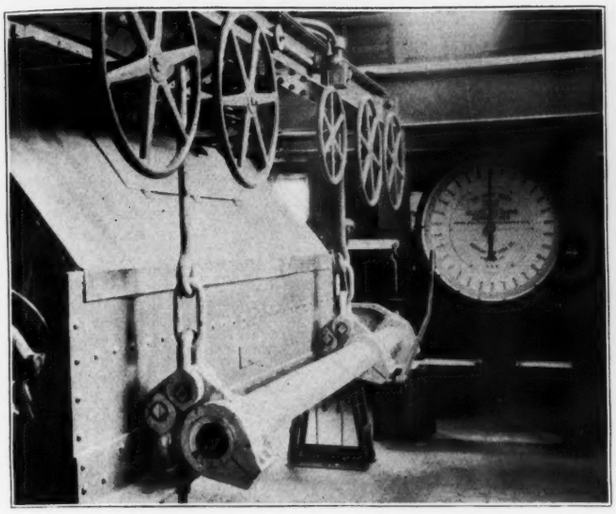
An illustrated story of this operation was published in the Dec. 3, 1930, issue of PIT AND QUARRY, on page 53.

Automatic Gravel Products Co.

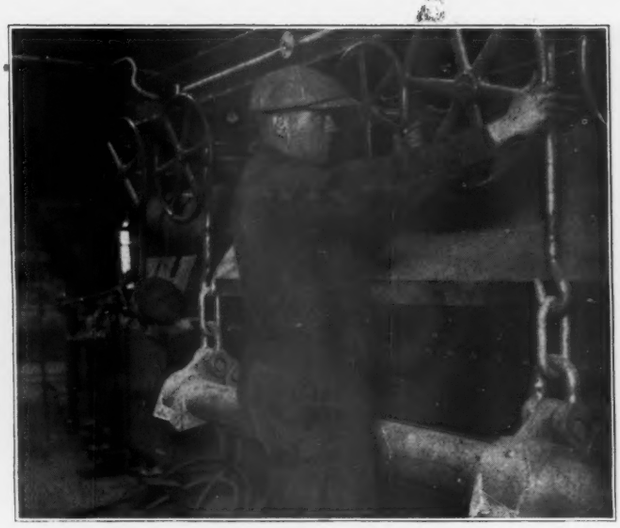
Several interesting features were incorporated in the design of the new Automatic Gravel Products Co. plant at Muscatine, Ia., which was placed into operation during the summer of 1930. Inasmuch as the volume of sand in this locality amounts to 85 per cent of the total volume of material produced, effort was made in the design of this plant to eliminate unnecessary handling of this material. Accordingly, the dredge-pump sludge is immediately sent over a sand screen after leaving the discharge box. Here the sand falls beneath into a sump and the gravel passes on to a belt conveyor leading to the gravel-process equipment. Obviously, the latter equipment operates with increased efficiency because of the absence of the sand bulk.

Sand is handled entirely by means of centrifugal pumps. One pump, an 8-in. unit, located adjacent to the sump near the sand screen, disposes the sand to an extensive stock-pile; when desired, the direction of flow is changed so that the material is pumped to a booster station near the carloading bin where another pump sends it to a settling tank mounted above the bins.

(*Continued on Page 128*)



Weighing batcher with dial scale at right.



The weighing batcher with water-measuring tank at left.

Concrete Plant Uses One Scale Batcher for Both Cement and Aggregates

By W. E. TRAUFFER

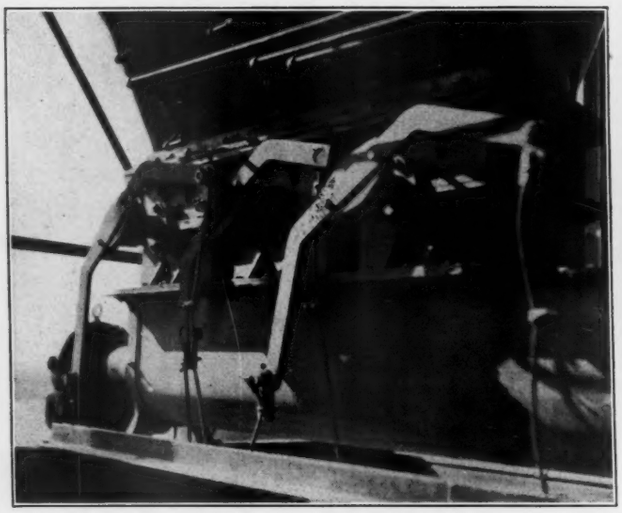
MANY new plants were put into operation during the past year for the production of ready-mixed concrete but of these only a few have aroused more than casual interest in the industry. Outstanding among these is the new plant of the Bridgeport Concrete Co. at Bridgeport, Conn., which went into operation on Sept. 6, 1930. This plant incorporates all of the more common features which make for the economical production of high-grade concrete, such as simplified control and bulk handling of cement, and a few that are not so common. Among these are the use of a single weighing batcher for aggregates and cement, the production of plant-mixed and truck-mixed concrete with the same equipment and trucks, and the careful enclosing of all machinery to prevent any deviation in the quality of the product due to weather conditions. Dry-batched material and any size of aggregate stored are also weighed out with the same equipment.

The plant was designed by K. B. Noble & Co., of Hartford, Conn., in coöperation with the Heltzel Steel Form & Iron Co., which designed, furnished and erected all steel work. This company also furnished all bins and chutes and the weighing batches as well as a large part of the minor equipment. Concrete footings and foundations were poured by the owning company which also enclosed the main structure. The main belt conveyor is enclosed with sheet asbestos and has steel sash windows. The plant has a capacity of 500 cu. yd. per day of either concrete or batched material.

This plant is located at 1211 Seaview Ave., Bridgeport, about one mile west of the business center of the city. It is on the east bank of the Piquonnock River not far from the point where the river enters Long Island Sound. This proximity to the Sound causes a tidal variation at the plant dock of approximately seven feet.

A view of the plant with the aggregate conveyor at left. One of truck mixers in foreground.

The sand and gravel used at this plant is purchased from Long Island operators and is delivered by barge to the plant dock on the river. A P & H Model 400 gasoline crane, operating a Blaw-Knox Dreadnaught ⅝-cu. yd. clamshell bucket, unloads the sand and gravel from the barges into a 7-cu. yd. steel plant hopper or into stock-piles. Some local aggregate is also purchased and this is dumped into piles from which it is rehandled by the crane.



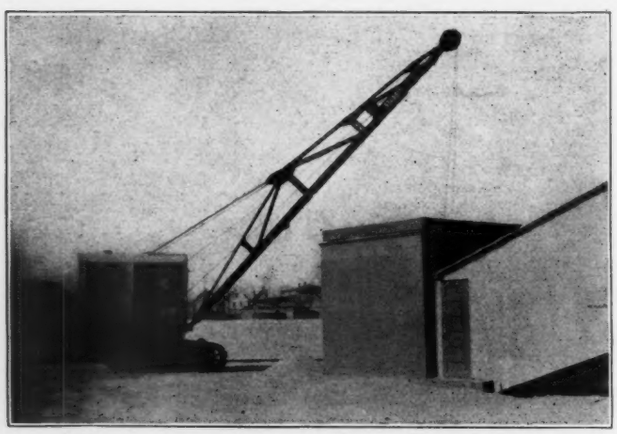
Rotary cement valves from storage bin to plant conveyor.

The reciprocating feeder under the plant hopper.

A Telsmith 16-in. reciprocating feeder discharges the material from the hopper onto a 20-in. belt conveyor on 210-ft. centers to the top of the plant. This conveyor has Rex-Stearns idlers and pulleys and Goodyear Style C belting. It is gear-driven at its head end by a 25-hp. General Electric motor and drives the feeder by chain from its tail pulley.

The belt conveyor discharges through a swivel chute, which is controlled from the operating floor by cable, into any of four compartments in the 400-ton steel aggregate bin. These compartments are formed by partitions on the center line of the bin bringing their discharge points close enough together to allow discharge into a single weighing hopper. This method eliminates considerable equipment as well as labor. As is the customary practice, the conveyor and the top of the bin are entirely enclosed to exclude the weather and help keep the moisture content of the aggregates uniform. This company goes a step further, however, and has a cover over the top of the plant hopper which is only removed when material is to be loaded for the plant.

Cement is received in bulk in box cars which are brought in on a siding alongside the plant. A Stephens-Adamson power shovel discharges the cement to a hopper which feeds a 10-in. Chain-Belt Rex steel-enclosed chain bucket elevator. This discharges through a steel chute with three separate flop gates into any of three compartments of the Heltzel 900-bbl.-capacity circular steel cement bin in which three kinds of cement are stored. The elevator is gear driven by a 25-hp. motor and the gates are controlled by chains from the top of the cement bin.



The gasoline crane loading aggregate to the plant hopper at right.

The desired aggregates are discharged from any of the four compartments of this bin through Heltzel roller-type bin gates which are operated by large hand wheels. All four gates discharge within a space about 4 ft. square and their four hand wheels are so located that the operator can reach all of them without moving from his post. The aggregates discharge into the 3-cu. yd.-capacity one-compartment Heltzel weighing batcher, which is equipped with an American Kron Scale Co. springless automatic non-oscillating dial scale of 15,000-lb. capacity.

Cement is recovered from any of the three compartments of the cement bin through three Fuller-Kinyon rotary valves, which are controlled by cable from the operating floor. Air jets in the bin insure free flowing of cement through the valves which discharge into a 12-in. Columbus screen conveyor. This carries the cement horizontally and discharges into the center of the weighing batcher. This conveyor is driven through a worm-gear speed reducer by a 5-hp. motor which, together with all other plant motors, is controlled from the batching floor by Cutler-Hammer push-button switches. The conveyor has a cut-off gate at its discharge end, the opening of which automatically starts the conveyor motor while the closing of the gate breaks the circuit and stops the motor. This arrangement gives absolute control of cement measurement.

The batcher discharges its load of aggregate and cement through a steel chute with a two-way discharge gate either directly into trucks below or into the concrete mixer, depending on whether truck-mixed or plant-mixed concrete is desired. The Chain-Belt Rex 3-cu. yd. drum-type mixer is on concrete foundations on an intermediate floor between the batching floor and the ground level. The mixer

Superintendent T. Reardon.

Washing one of the trucks at the close of a day's work.

is driven by a 60-hp motor through a set of gears.

Water is measured in a Rex 160-gallon capacity syphon-type water measuring tank. This is controlled by a dial which is readily set for the amount of water required for each batch. The water can be discharged into the mixer when producing plant-mixed concrete or into water tanks on the trucks for truck-mixed concrete. Three Rex Moto-Mixers, mounted on Mack trucks, serve as agitators or mixers as desired.

The simplicity of operation and centralized control of this plant make it possible for one man to control all operations without moving out of a space a few square feet in area. The use of a single batcher reduces the number of adjustments the operator must perform for each batch and the type of scale used eliminates changes in the adjustment of the scale for each change in the mix. By consulting a simple table, the quantities of material for any mix may be readily obtained for any size batch, if the various materials are indicated on the batch card in the following manner:

Material	Weight *(lb.)*	Dial Reading *(lb.)*
Sand	1,300	1,300
No. 1 stone	1,400	2,700
No. 2 stone	1,450	4,150
Cement	780	4,930
Water, 30 gal.		

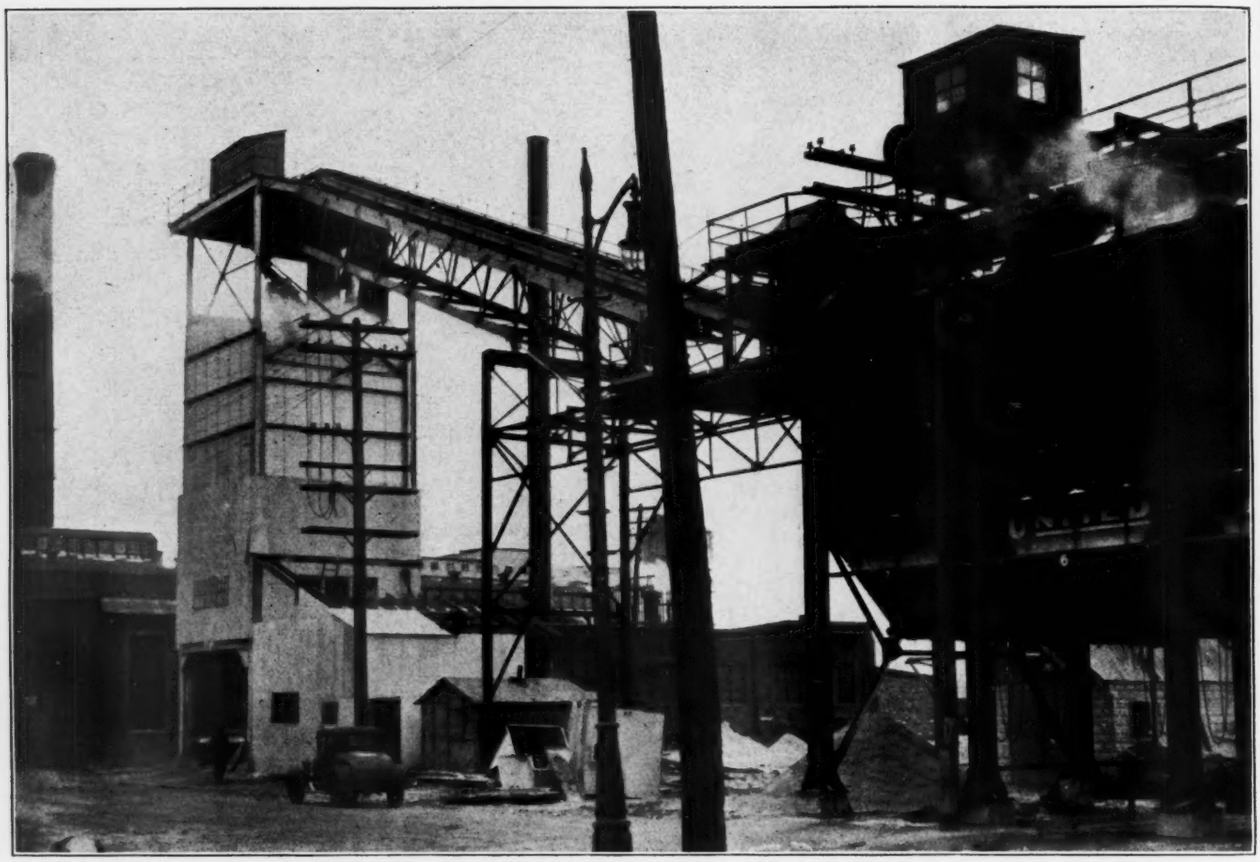
In addition to the operator, a craneman, for handling aggregate to the plant, and a laborer, for unloading cement, are required part of the time. Both of these men do other work about the yard when not needed at the plant.

In addition to concrete the company retails sand and gravel and trap rock. Two sizes of sand and ¾-in. and 1-in. gravel are stored in the aggregate bin. Trap rock is also stocked when specified. All of these aggregates are weighed in the batcher and loaded out through the truck-loading spout. Dry-batched material is also loaded out in this manner. These materials are also delivered in the same trucks.

(Continued on Page 100)

The split chute which feeds to trucks or to mixer at right.

Batched material being fed through chute to truck mixer.



View of plant from street side showing new boiler building under construction. Material-yard bins at right.

Plant in Detroit Supplies Truck-Mixed Concrete Throughout Winter

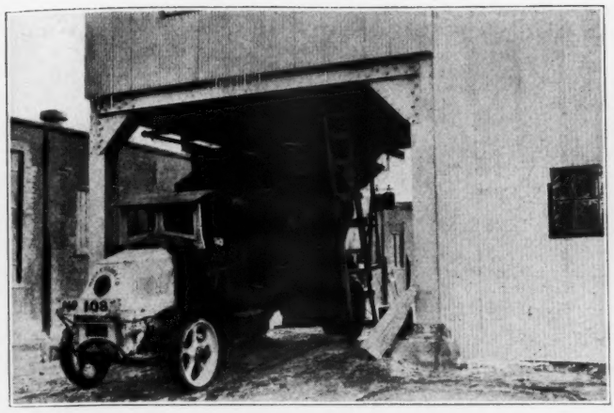
ONE of the most recent of the many new plants which have been built during the past year for the production of truck-mixed concrete is the plant of the Mark R. Hanna Co., in Detroit, Mich. This plant, which has a capacity of 800 cu. yd. in a 10-hour day, went into operation on Sept. 1, 1930. It is located at 1440 Atwater St., on the Detroit River, and is only one mile east of the downtown section of the city. A temporary plant was operated from March, 1930 until the present plant was completed. The new plant adjoins the material yard of the Lake Ports Supply Co. from which its aggregate requirements are supplied. This yard receives its sand, gravel and stone by boat. Incidentally this is probably the largest material yard in the city, with a capacity of 20,000 tons per day.

Aggregate is received from the yard on an inclined belt conveyor which is 42 in. wide, on 70-ft. centers and has a capacity of 1,000 tons per hr. This discharges through a pivot chute into the four-compartment Butler steel bin above the batching plant. Two compartments with a capacity of 100 cu. yd. each are used for sand and 1½-in. stone while a third compartment of the same size is divided and holds 50 cu. yd. of pebbles and 70 tons of cement.

Cement is delivered to the plant in bulk from the near-by distributing plant of the Huron Portland Cement Co. in special truck trailers. These trucks discharge through screw conveyors into a hopper at the plant from which a 10-in. screw conveyor feeds to a steel-enclosed Webster chain-bucket elevator. This discharges through a chute into the storage compartment previously described. Another cement bin with a capacity of 25 cu. yd. is being installed and will be used for special cement. This bin will be attached to the large bin and supported by it. It will be fed through a two-way gate from the same cement elevator and will discharge in the same manner as the large bin.

The aggregates are discharged through any of six clamshell gates, two in each aggregate bin, into the Butler 8-cu. yd.-capacity weighing hopper which is equipped with a Kron non-oscillating dial scale. Cement is fed from either of the two compartments through Fuller-Kinyon rotary cement valves into a 3,500-lb.-capacity weigh hopper equipped with a Winslow beam scale having a dial attachment for rapid reading.

Water is measured in a Blaw-Knox 300-gal.-capacity vertical tank with a revolving scale for the



One of the truck mixers being loaded at the plant. Building for boiler and water heater at right.

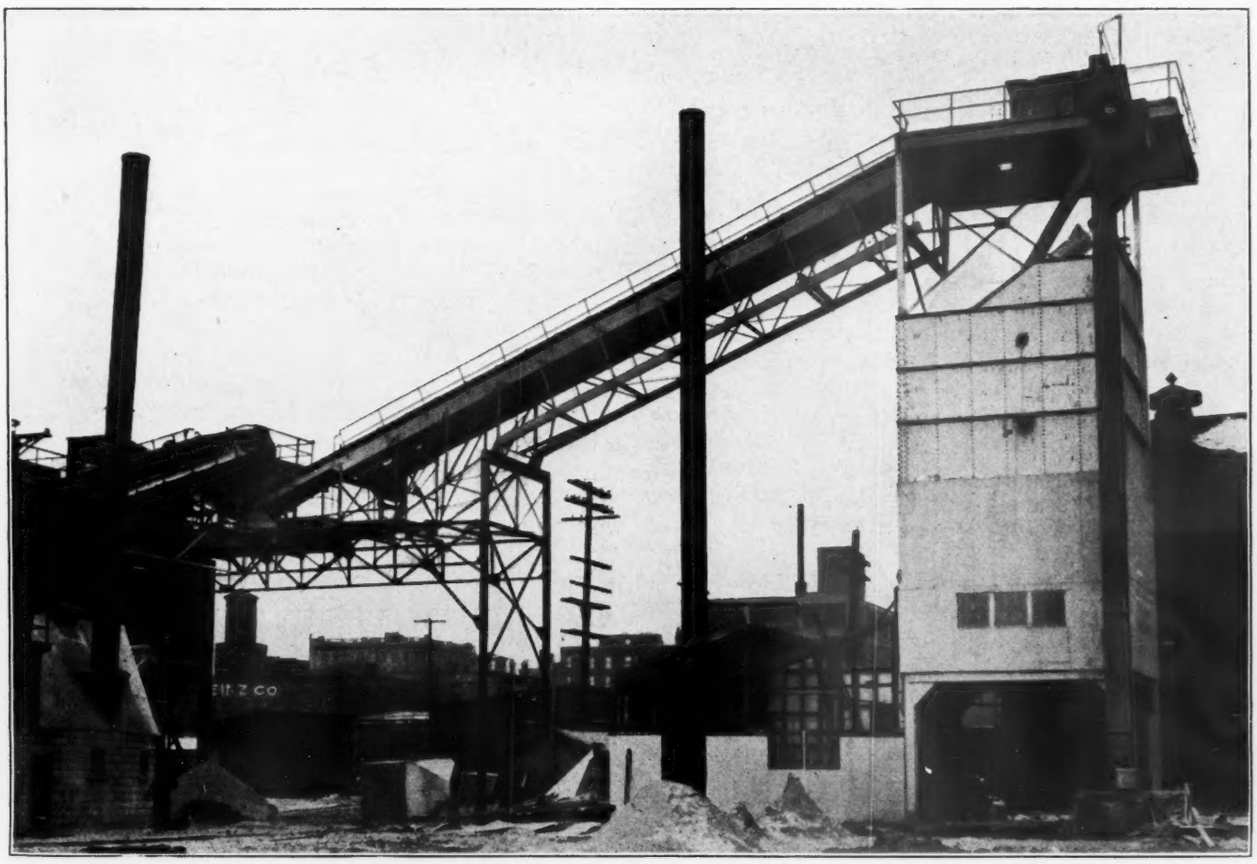
Heated concrete being discharged to the approaches of the new Detroit-Windsor vehicular tunnel.

amount of water required and a second adjustable scale to allow for the moisture in the aggregate. The measuring scale is hexagonal and is graduated for ratio concrete in pounds of cement for each batch. Unity on one face of this scale is 7.48 gal. of water per sack of cement. The other five scales read by tenths down to 0.5 of unity or 3.74 gal. per sack. By this system the amount of water required for each successive batch is readily and accurately determined.

The weighing hoppers discharge the aggregate and cement through the regular transit-truck feeding chute into trucks. One man on the batching floor controls all operations and the driver of each truck fills the truck water tank with the water that has been previously measured by the operator.

The company at present delivers and mixes its concrete in eighteen Paris Transit-Mixers. Fourteen of these are the 4-cu. yd. type and are mounted on Mack trucks. Two 3-cu. yd. bodies are mounted on Mack trucks while a third 3-cu. yd. body is on a Gottfriedson chassis. The company also has a 5-cu. yd. body mounted on a 10-wheel Gottfriedson chassis.

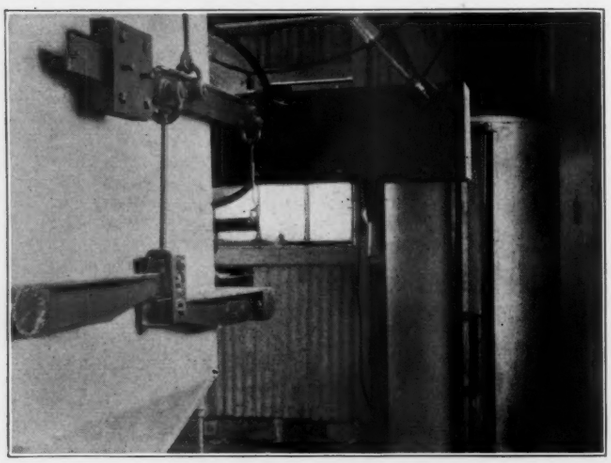
Concrete is delivered to practically any part of the city of Detroit as far as ten miles in any direction. There are no restrictions against the use of this concrete in any kind of work. It is used for sidewalks, streets, buildings, etc. At the time the plant was visited, concrete was being furnished for



View of plant from the dock side with system of conveyors from material yard at left.

some finishing touches that were being put on the new Detroit-Windsor tunnel.

Operations will be carried on throughout the winter to serve several construction projects that are under way. A coal-fired boiler furnishes steam at 125-lb. pressure for steam jets in the aggregate bins and a Simms hot-water heater of 2,000-gal. capacity heats the mixing water. That this system



The aggregate weighing batcher with dial scale at left and water-measuring tank at right.

of heating the concrete is practical is evident from the accompanying photograph which shows a truck delivering a steaming-hot load of concrete at a job over a mile from the plant. On the day this photograph was taken the temperature was only a few degrees above zero. The boiler and water heater are in a separate small building.

Every possible precaution is taken to insure a uniform high-grade product. The aggregates are tested every 30 minutes for moisture and the concrete every hour for strength. Beginning January 1, 1931, every load sent out of the plant will be certified by a licensed testing laboratory.

The plant was designed by the Butler Bin Co. which furnished the entire structure, bins, framework, weighing batcher and loading chute. The steel bin supports form the plant framework and the batching floor and boiler room have corrugated metal siding and roofing. The plant was designed with extra heavy beams on one side so that a second duplicate installation can be added without interfering with the operation of the present unit.

The present plans of the company are to install this second unit, doubling the capacity of the plant, about May 1, 1931. At the same time about 30 additional Paris Transit-Mixers will be added to handle this output. Eventually several more plants will be built in other parts of the city.

The main office of the Mark R. Hanna Co. is at Ryan Road and Nevada St. The company's main business is general contracting but a material yard and asphalt plant are operated at this location. Officers of the company are: Mark R. Hanna, president; Alfred G. Wilson, vice-president; Roy W. Burks, vice-president and general superintendent and Charles P. Seider, vice-president. S. J. Bleil is superintendent of the concrete plant.

Supplies Concrete Throughout Winter

(Continued from Page 97)

The signalling system at this plant is also rather interesting. A Lamson pneumatic-tube system connects the operating floor of the plant with the office a few hundred feet away and insures the rapid and accurate filling of orders. Lights over the batcher are used as signals from the truck drivers to the operator. A small Sullivan air compressor furnishes air for the aeration of the cement bin, for oil spraying the trucks, and for general cleaning purposes.

Officers of the company are: John G. Schwarz, president; Howard Clark, vice-president; Homer C.

View taken before enclosure of plant was completed showing mixer discharging to truck.

Godfrey, treasurer; and Benjamin Parkham, secretary. T. Reardon is plant and yard superintendent.

Rate of Solution of Fine Particles of Gypsum and Anhydrite

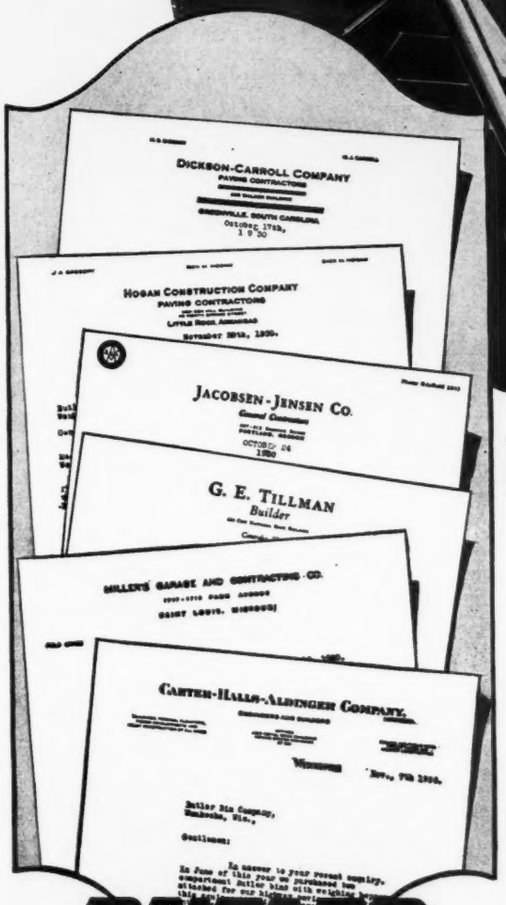
In connection with a study of the utilization of anhydrite for the retardation of Portland cement, the Non-metallic Minerals Experiment Station of the U. S. Bureau of Mines at Rutgers University, New Brunswick, N. J., has determined the rates of solution of very finely-divided gypsum and anhydrite. For particles of both of these materials above 35 microns in size (one micron = 1/25,000 of one inch) the specific dissolution factor (rate of solution per unit surface of material of a given particle size divided by the rate per unit surface for particles larger than 35 microns), is unity. For gypsum the specific dissolution factor increases with decreasing particle size until a maximum of 3.9 is reached at 15 microns, whereas for anhydrite a maximum of 17.8 is reached at 1.5 microns. Below 15 microns the specific dissolution factor for gypsum drops rapidly reaching the extraordinarily low value of 0.08 for a 3-micron particle and of 0.03 for a 1-micron particle. This is to be contrasted with a value of 16 for a 1-micron particle of anhydrite.

Thus very finely-ground anhydrite tends to dissolve relatively rapidly, but very finely-ground gypsum relatively slowly. The details of these experiments are to be published in the near future.

. . . ask the OPERATOR

—about

Butler Equipment



HE will tell you that it's a snap to handle aggregates with Butler Bins and Weighing Hoppers. Owners, too, are enthusiastic about Butler equipment. Read what a few of them have to say in the following excerpts from letters shown on this page:—

". . . Butler Bin and Weighing Hopper—very satisfactory—do not see how contractor could be without them—easily weigh out two batches per minute."

". . . to use equipment for months with no upkeep or maintenance is a new and interesting experience. With a single operator we weigh two batches per minute — more than twice the speed required."

". . . bin worked perfectly; not only enabled us to produce concrete cheaper, but to mix much larger quantities."

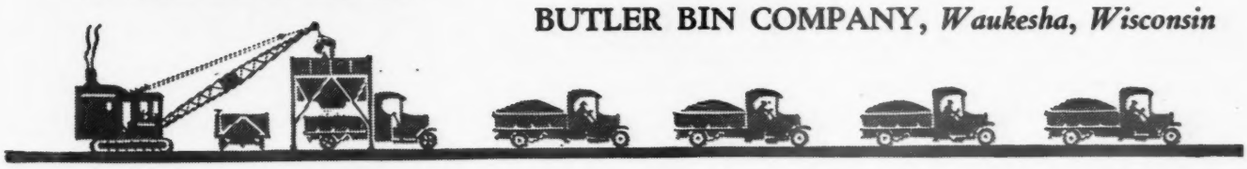
". . . entirely satisfied. If we were in the market for another outfit, we would buy a Butler."

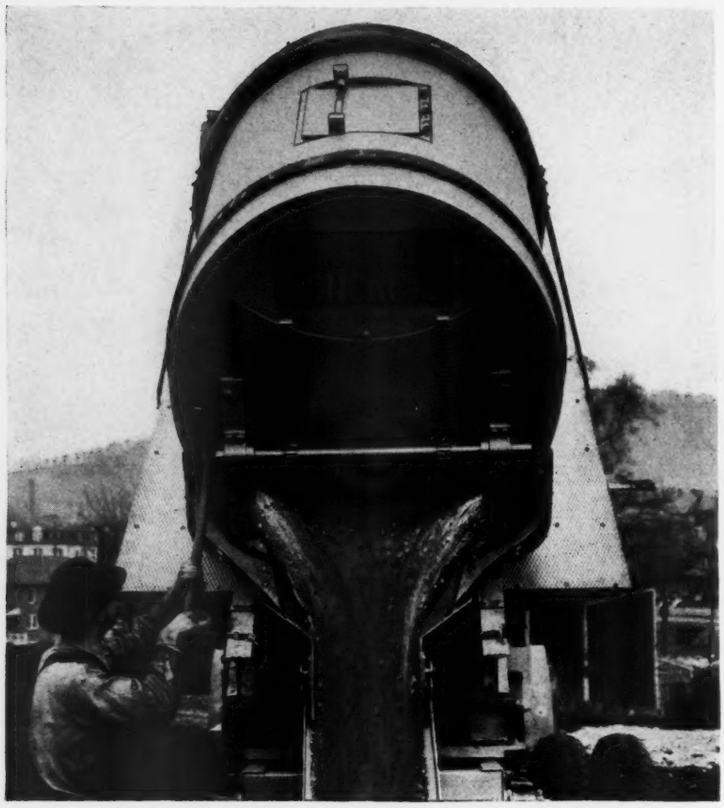
". . . we are not subjected to shutdowns on account of scales varying, as they stay in perfect balance."

If the experience of these satisfied users interests you, we will be glad to tell you more about it at the Road Show—*Booth AR-16.*

BUTLER BIN COMPANY, *Waukesha, Wisconsin*

BUTLER
Steel **BINS**
and **HOPPERS**





Announcing

a new type of Clinton Conveyor-Conditioner, that handles ready-mixed concrete of any consistency . . .

Effective processing of low-slump mixtures. No sticking of contents to walls of tank. Immediate, free discharge.

THE new Type 2 Clinton Conveyor-Conditioner offers to central-mix operators the same advantages, for hauling pavement and other low-slump concrete mixtures, that are already familiar in handling construction concrete.

Close-grained, uniform mixtures, free from pores, are greatly desired by engineers. Free, rapid pouring is important to the contractor. With the new Clinton Type 2, both benefits are assured to central-mix users regardless of high or low slump of the concrete carried.

With the Type 2, mixtures of any slump may be hauled and dumped clean on reaching the job.

The new Clinton Type 2 will be exhibited at the Road Show in St. Louis, Jan. 12-17. Don't fail to see it and learn more about this notable improvement in concrete handling.

New catalog just issued will be sent on request.

Diagram shows how Clintonizing expels air entrained by mixing.

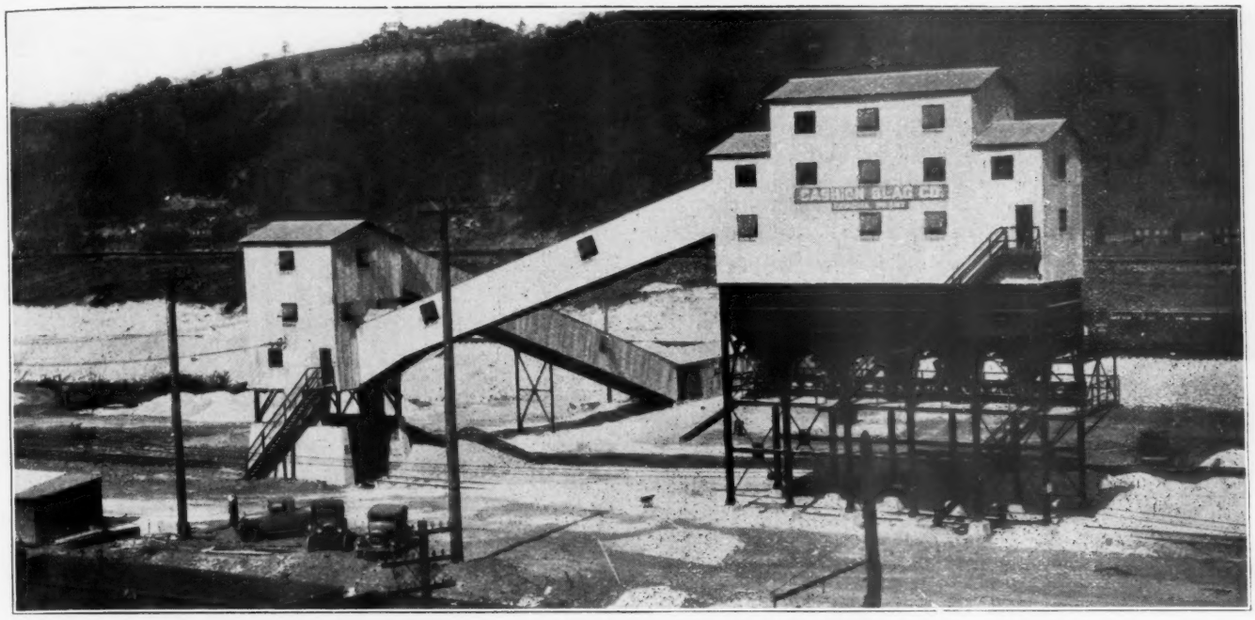
CLINTON MOTORS CORPORATION

Noble & Grace Streets, Reading, Pa.

"CLINTONIZING"

(PROCESS PATENT APPLIED FOR)

The Final Touch to Ready Mixed Concretes

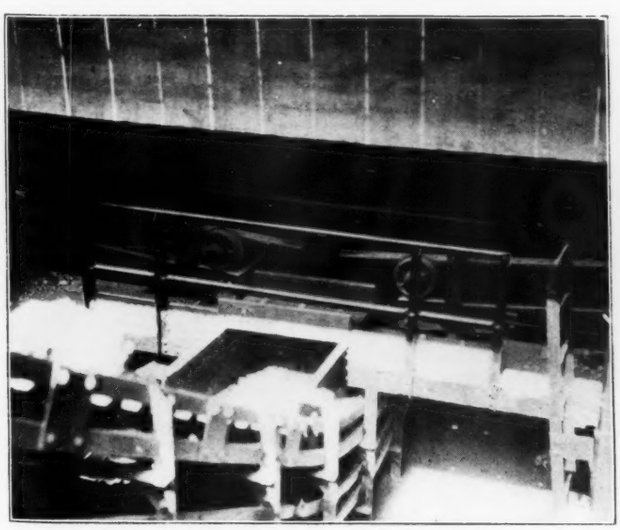


The Cashion Slag Co. plant. Screening building at right.

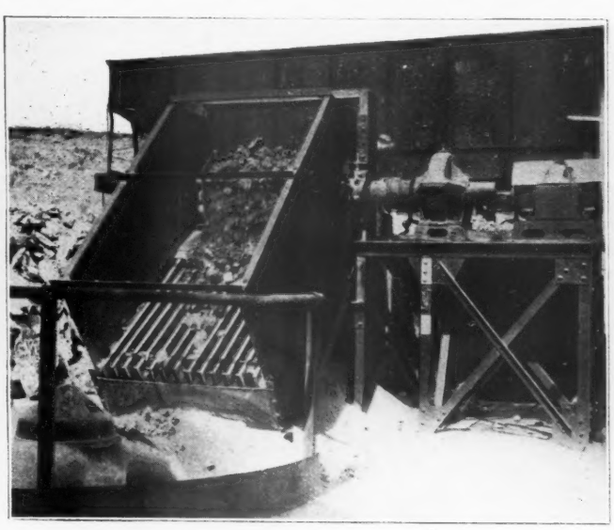
Production Capacity of Slag Industry Is Unchanged During Past Year

CONDITIONS in the slag industry in general were satisfactory during the past year. Existing plants operated at capacity the greater part of the year and a number of extensive plant improvements were made. Several new plants were built, but as several older plants were discontinued there was no great change in the total production capacity of the industry. It is well known that the number of sources from which commercial slag can be procured is limited and that there are plants processing this slag at almost every such source located near enough to a market to be economically practical. This condition differs from that in any of the other non-metallic minerals industries and necessarily limits the number of new plants built.

The new plant of the Cashion Slag Co. at Baird Station, Pa., which was completely described in the Nov. 5, 1930, issue of PIT AND QUARRY, is for several reasons one of the outstanding operations in the slag industry. The plant was built for permanence and all structures are of concrete and steel. Its design is in accord with the best modern practice in that it has simplicity of operation without sacrificing flexibility. The low horsepower requirements, type of construction, and the fact that only the highest grade of equipment is used should make this



Reciprocating feeder below track hopper at Cashion operation.

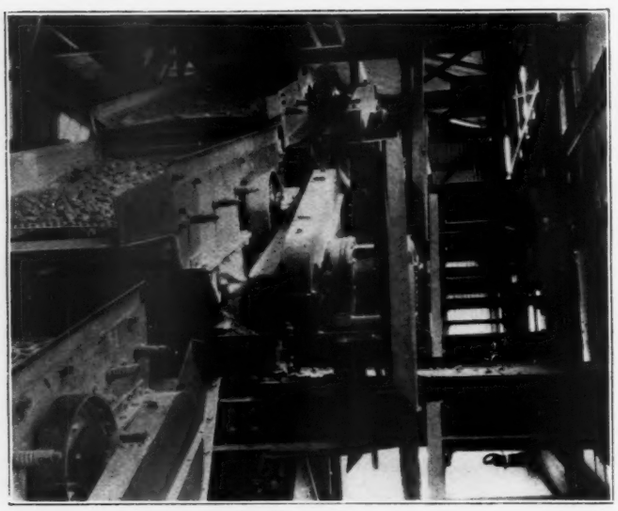


Pan conveyor discharging slag to primary-crusher grizzly.

an unusually economical plant to operate. It has a capacity of 215 tons per hour.

Slag is loaded into railway bottom-dump cars by a Bucyrus-Erie 2-cu. yd. electric shovel and an Erie ¾-cu. yd. gas air shovel. These are hauled to the plant and dumped into a track hopper. The slag is fed by a reciprocating feeder to an apron conveyor which feeds through a grizzly to the Telsmith Type 16A primary gyratory crusher. The crushed material then goes by belt conveyor to the crusher building. A Dings magnetic separator and a grizzly at the head of this conveyor take out the iron and allow the fines to bypass the Symons 3-ft. cone secondary crusher. When desired the grizzly bars can be removed so that all material will bypass this crusher.

A second belt conveyor takes the slag to the screening building, where it is sized over three Robins Gyrex vibrating screens. A fourth Gyrex screen fed by conveyor from one of these does the fine sizing. All sizes discharge to five steel bins of 65-ton capacity each. These bins can discharge individually through bottom gates or onto a mixing or loading conveyor into cars or trucks for shipment.



Three single-deck screens in Cashion slag plant.

Provisions are also being made for water shipment on the Monongahela River which is only a few hundred feet from the plant. Rehandling of material to and from stock-piles is with an Ohio 1¾-cu. yd. gasoline locomotive crane.

This plant was designed by the Robins Conveying Belt Co. which also furnished most of the equipment, including the feeder, vibrating screens, belt conveyors and belting and bin gates. This company also built the entire plant with the exception of the steel work and bins which were furnished and erected by the Lackawanna Steel Construction Co. Most of the drives are through Falk speed reducers.

Lake Ports Supply Co.

The new slag plant of the Lake Ports Supply Co. at Detroit, Mich., is also without question as modern as any plant in existence. It, also, is of concrete and steel construction. Slag is unloaded from barges at the plant dock and carried by an inclined pan conveyor to the crusher building. A gyratory crusher does the primary crushing and any recrushing necessary is done by a double-roll crusher.

The new slag plant of the Lake Ports Supply Co. with plant-loading hopper in foreground.

A bucket elevator takes the crushed slag to the top of the screening building. Sizing is done by a vibrating scalping screen and two revolving screens and final sizing by two vibrating screens. There is ample space about the plant for stock-piling and a conveying system is to be installed which will allow stock-piling without rehandling.

Characteristics and Occurrences of Pumice and Pumicite

Pumice is usually found in solid coherent masses which are generally white or light gray in color, says Dr. Oliver Bowles in the Bureau of Mines report *Abrasive Materials in 1929*, just published. It occurs in the vicinity of active or extinct volcanoes and consists of extremely porous glassy lava which has been forced out by the sudden expansion of gases inclosed in the molten magma. When dry the blocks are so porous that they will float on water. Lump pumice is used for polishing various metals; for rubbing down wood surfaces in the manufacture of furniture, pianos, phonographs, radios, and automobile bodies; and for cleaning and polishing stone and glass. Fine lump pumice is used as a toilet article. Ground pumice is used in cleaning, scouring, and polishing compounds, in tooth pastes and powders, and as an abrasive in rubber erasers.

Pumicite, also known as volcanic dust or volcanic ash, consists of small, sharp, angular grains of volcanic glass. It is used in making cleansing compounds, abrasive hand soaps, and metal polishes. Usually it is less uniform in grain size than diatomite and therefore finds more limited use as a fine polishing powder.

Production of pumice and pumicite in the United States in 1929 was reported from Yuma County, Ariz.; from Fresno, Imperial, Inyo, and Mono Counties, Cal.; from Meade, Norton, and Sheridan Counties, Kan.; from Frontier County, Neb.; and from Klamath County, Ore. In California the output was largely lump pumice. In Kansas and Nebraska the pumice was dug from beds of fragmental volcanic glass or so-called ash.

Marked Progress in Production Methods Noted in Crushed-Stone Plants

THE crushed-stone industry in general had a fairly good year in 1930 in spite of the slackening in business which affected a number of other industries. As was the case in the other important non-metallic minerals industries, the decreased demand for aggregate in construction work was largely compensated for by the large paving programs carried on in almost every part of the country.

In comparison with other years there was a decrease in the number of new plants built but several of these were of such size that the increased capacity of the industry probably kept pace with the average rate of increase of recent years. Many plants were rebuilt or enlarged during the year, many of them to provide for the increased production of the smaller sizes of aggregate which are rapidly coming into greater demand. Many plants also installed equipment for washing stone to meet increasingly rigid specifications. Several typical new plants and a few plants in which interesting improvements were made are reviewed in this article.

Inland Lime & Stone Co.

In November, 1930, the Inland Lime & Stone Co. placed its huge plant at Port Inland, Mich., in full production, thereby completing the construction of one of the largest crushed-stone plants in the country.

The speed with which the plant was erected was in itself, something of a record, considering the size of the operation and its location. In November, 1929, it was in the project stage; scarcely a year later, it was on a full production basis. In this short period, not only was much of the equipment designed from the ground up, built and erected, but a seven-mile electric railroad and a harbor was completed, this part of the program having been commenced in the spring of 1929.

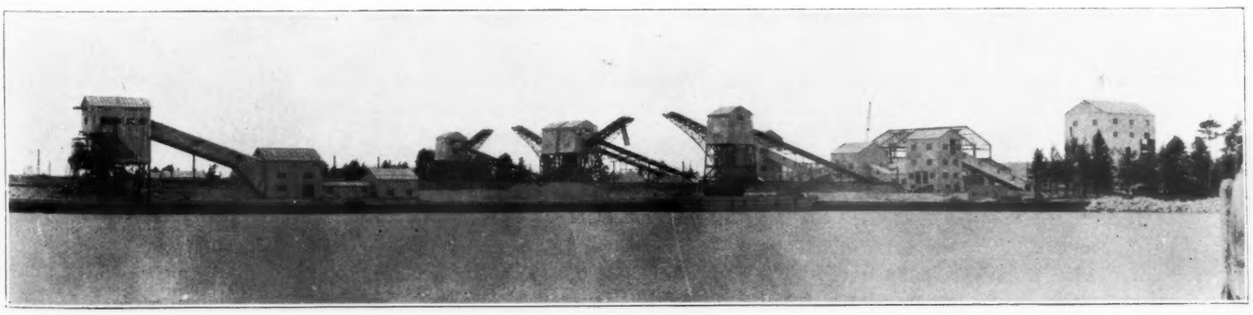
Briefly, the plant consists of three divisions: (1) quarrying, (2) processing and delivery to storage, and (3) reclaiming and loading.

Methods of quarrying the rock are conventional. At present, a quarry face about one mile long is being worked, the entire 60-ft. deposit being quarried as a single bench. Two 5-cu. yd. electric shovels load the blasted rock into the cars, which are sent to the plant over the 7-mile electrified railroad, which not only serves as a medium for raw material transportation, but connects the plant with the Soo Line, providing a rail outlet for finished materials and a land inlet for machinery and freight.

At the plant the processing of the stone begins with the primary crushing in the 60-in. McCully crusher. Crushed material, with that passing through a grizzly is then sent to another building called the grizzly house, where it is sent over two live-roll grizzlies for scalping. The oversize and throughs from the grizzlies are then sent to the secondary crushing system or to the stock-piles, as desired, this point in the flow acting as a distributing center. The secondary crushing equipment consists of a McCully 20-in. crusher and a Symons cone crusher. When crushed, the material is sent to the screen house. Here six vibrating screens, arranged in banks of two, classify the material into the desired sizes. The flow of materials is partly by gravity and partly by conveyors. All the material for recrushing is gathered on one belt and is sent to the Symons crushers. Other conveyors deliver the fines from the upper bank of screens to the triple-deck screens for further classification. Conveyors are also used to transport the desired sizes of material to the stacker for storage.

The storage space consists of an area of about 500 ft. by 1,200 ft. and is divided into 2 sections by the tracks on which the stackers run. The stackers, which are movable towers about 60-ft. high each equipped with an extension about fifty feet long supporting the frame work on which the conveyor is carried, are in reality nothing more or less than huge belt trippers. The stacker, by means of a wing conveyor extending out over the stock-pile, sends the various sizes of material into storage.

Concrete tunnels have been built down the center of each storage area, and each tunnel is equipped with loading gates feeding a conveyor within. At right angles to the reclaiming tunnels another tunnel receives the material and delivers it to another conveyor system to the loading house. Here the



General view of the Inland plant. The primary crusher-house is at the extreme right, and the loading tower at the extreme left.

Grizzly house (left), secondary-crusher house and screen-house, with primary-crusher house in distance. Inland plant.

material is prepared for final loading into the boats.

F. H. Clement & Co.

The most recent development in the crushed-stone industry in northeastern New York State is the new plant of F. H. Clement & Co. at Comstock, which went into operation late in the summer. The plant was erected to fill a contract with the Delaware & Hudson Co. for railway ballast. This contract calls for a total of 400,000 tons of rock to be furnished during a period of three years.

The deposit is owned by the railroad and consists of an extremely hard trap-rock in a somewhat irregular and broken formation. What little stripping of overburden is necessary is done with an Erie 1-cu. yd. shovel which is used also for loading stone in the quarry.

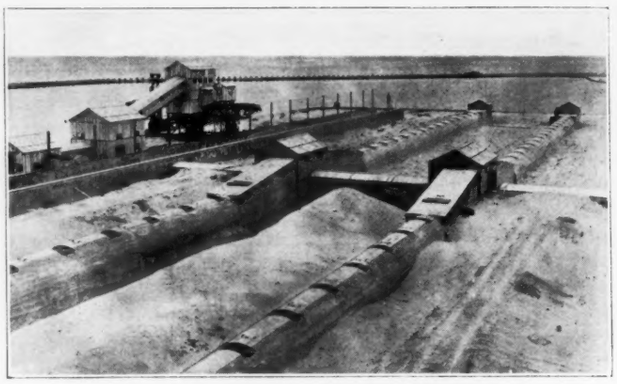
The face, at present, averages about 40 ft. in height. Drilling is done by two Loomis Clipper well drills and blasts of from three to five single-row bank shots are made.

A Marion Type 37 crawler shovel with a 1¾-cu. yd. dipper loads the stone into three Mack 6½-ton trucks, which haul it to the plant. The trucks dump their loads into a steel hopper mounted on concrete foundations. This hopper feeds the stone directly into the Traylor Bulldog 42-in. by 48-in. jaw primary crusher. Because of the size of this crusher, no grizzly is used over the hopper.

The crusher discharges the stone onto a 30-in. inclined belt conveyor extending to the scalping building. There the stone is discharged onto an inclined rail grizzly with 2½-in. spacing. The oversize drops through a split chute to two Traylor Bulldog 14-in. gyratory crushers which are set at 2½ in. The material passing through the grizzly and that from the two gyratories go to the boot of a belt-bucket elevator which carries the material to the top of the screening building.

The elevator discharges to a steel hopper which feeds a Robins Gyrex 4-ft. by 8-ft. double-deck vibrating screen. This has 2¾-in.-mesh wire cloth on the top deck and ¾-in. screen cloth on the bottom deck. The material retained on the top deck drops through a chute back to the gyratory crushers, while the two other sizes go directly to two compartments in the 100-cu. yd.- capacity timber bins that support the screening plant. These bins discharge through bottom- and side-discharge gates into cars on a double-track siding.

Due to the extremely hard and abrasive rock in this deposit, two men are kept busy most of the time in sharpening the drill steel. The blacksmith shop houses a forge and an Ingersoll-Rand pneumatic drill sharpener, which are used for this purpose. Air for the drill sharpener is furnished by an Ingersoll-Rand portable, 10-in. by 8-in. gasoline-driven compressor in a nearby building. An Ingersoll-Rand 5½-in. by 8-in. portable gasoline-driven compressor in the quarry furnishes air for the Jackhamers. Each of these compressors has an air-storage tank and both are inter-connected so that neither operation would have to be entirely shut



Two of the reclaiming tunnels, the main gathering tunnel, and the transfer stations at the Inland plant.

down in case of the failure of one of the compressors.

Bluffton Stone Co.

Another new crushed-stone plant was added to the already imposing number of plants operating in northwestern Ohio. This plant was designed for truck shipments only and, consequently, has an entirely local trade.

The new plant of the Bluffton Stone Co., Bluffton, Ohio, went into operation on July 10, 1930, slightly more than three months after construction was started. It has a capacity of about 80 tons per hr. All buildings are of permanent construction with concrete foundations, wood framework, and corrugated-metal siding and roofing.

The plant is on a property of 21 acres just outside of the southern corporation limits of Bluffton. The property adjoins the main-line right-of-way of the Nickel Plate Ry., and is inside the yard limits. This will be an advantage should the owners ever decide to enlarge their territory and install facilities for rail shipments.

The topography in the vicinity of the plant is flat, and the overburden averages less than 3½ ft. in depth. This is removed during slack periods by the same shovel that is used for loading stone. Although tests show good rock to a depth of over 100 ft., it is unlikely that the quarry will be worked to a greater depth than 50 ft. This restriction is due to the large amount of ground-water below that depth which would require heavy pumping expense

General view of the F. H. Clement plant showing storage and loading facilities.

to keep the quarry dry. An 8-in. Fairbanks-Morse horizontal pump is operated when conditions demand it.

Drilling of the deposit was done with a well-drill rig, and enough stone was blasted to keep the plant in operation for the balance of the year. Because of the character of the stone, no secondary drilling or blasting is necessary.

The stone is loaded by a Thew shovel into a 3-cu. yd. Watt end-dump steel car. This car is hauled up a single-track incline into the plant and discharges into a No. 6 McCully gyratory primary crusher. This discharges to a Telsmith belt-bucket elevator which feeds the stone to a surge bin.

The surge bin allows a controlled feed to the 3-ft. by 6-ft. Niagara single-deck vibrating scalping screen which has 2½-in.-mesh wire cloth. The oversize drops to a Symons 3-ft. cone crusher whose product, together with the material passing through the screen, goes to a Webster belt-bucket elevator. This discharges to another surge bin at the top of the screening plant which feeds to two 3-ft. by 8-ft. double-deck Niagara vibrating screens. The four sizes of stone and dust discharge into a five-compartment concrete bin with a total live-storage capacity of 500 tons. Trucks are loaded in two tunnels under the bins. Shipments are weighed on a 15-ton Fairbanks platform scale at the office, a neat frame structure near the plant.

Looking down main conveyor to primary crusher. F. H. Clement & Co.

Truck of the Bluffton Stone Co. being loaded in concrete tunnel under bins.

Plant and quarry of the Bluffton Stone Co.

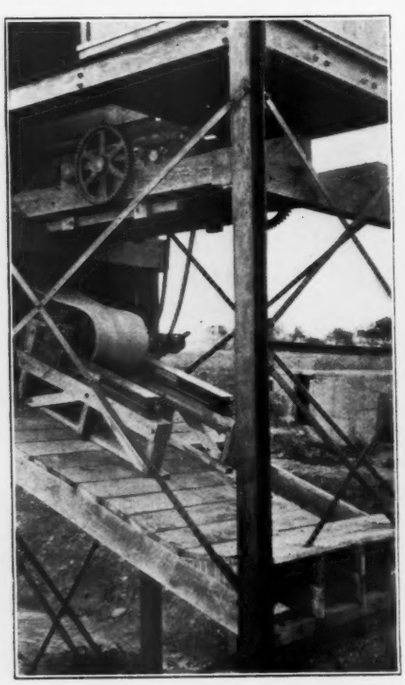
American Stone Co.

A new crushed-stone plant at Lima, Ohio, while not a large one, reflects the tendency toward the use of vibrating screens for the classification of materials. The American Stone Co., owner of the new plant, incorporated in the plans provision for expansion. In so doing, the secondary-crushing equipment can be increased, as well as the vibrating-screen equipment, at any time when necessary without entailing costly alterations or additions to the buildings.

Quarry operations at this plant are conventional. Secondary blasting is, however, unnecessary because of the highly stratified condition of the rock.

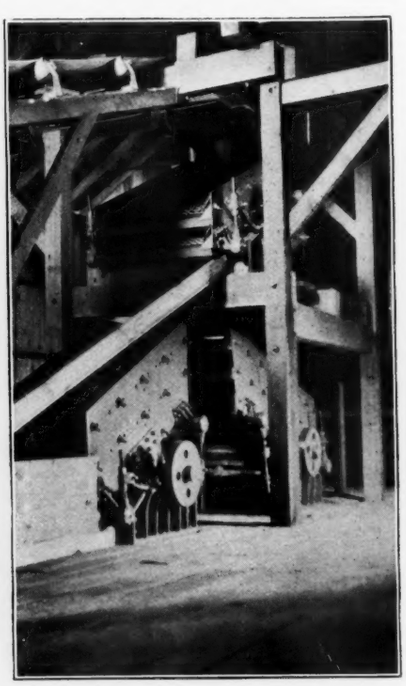
Primary crushing is done with a Traylor 16-in. Bulldog crusher which discharges to a conveyor, thence to a 25-ton-capacity surge bin. A plate feeder regulates the flow of material from the bin onto a conveyor which, in turn, transports it to the screening house. Three Huron screens classify the crushed material into 3½-in. to ¼-in. sizes. The first unit has two decks, the top deck being a 3½-in-mesh screen for scalping. The second deck has 1-in.-mesh screen. All material (3½-in. to 1-in. sizes) passing over the latter screen is chuted to a Huron 3-ft. by 6-ft. triple-deck screen which separates the material into 2½-in., 2-in., and 1½-in. sizes. Throughs from the 1-in. lower deck of the scalping screen are sent to a Huron 4-ft. by 8-ft. triple-deck screen for the production of ¾-in., ½-in., and ¼-in. materials.

Provision has been made for the recrushing of 2½-in. to 2-in. material by returning it to a Traylor 8-in. Bulldog crusher which, at the same time, recrushes the scalping-screen rejects. A Symons cone crusher recrushes 1½-in. to 2-in. and the 1½-

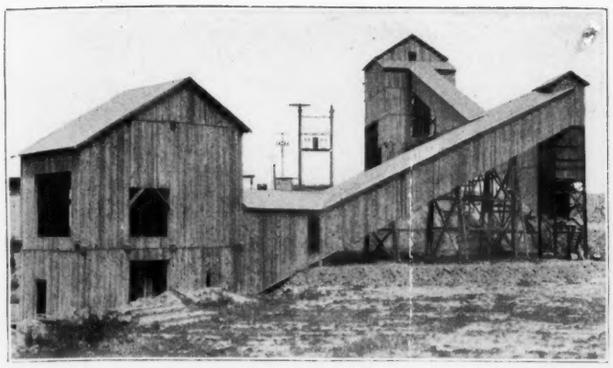


Feeder which regulates the flow of material from surge bin to conveyor.

Steam-shovel dipper about to drop load of rock into steel dump car.



Battery of vibrating screens. All three views of American Stone Co.



Plant of American Stone Co. Surge bin at extreme right.

in. minus materials to ½-in. or less. Provision has been made for the installation of another Symons crusher for the recrushing of smaller sizes of stone.

With two cone crushers, the capacity of the plant can be concentrated on any size desired, from ½-in. up, without rehandling material from storage.

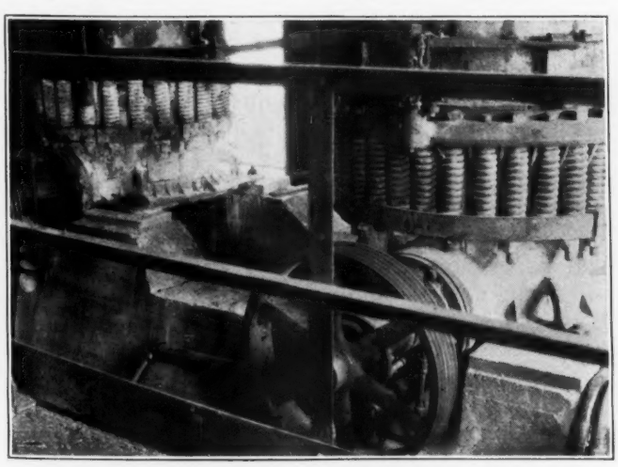
Storage of materials is provided by an 8-compartment bin which is equipped with a conveyor delivery apparatus. This conveyor system sends any size material, or proportion of sizes, to the washing house where bin-breakage dust can be removed by either dry-screening or a washing process.

Definite plans were made to augment the bin structure with a stock-pile, using the trestle-loading and tunnel-delivery system.

Elmhurst-Chicago Stone Co.

There has been a distinct trend in the crushed-stone industry, especially during the last few years, toward the construction of permanent, fireproof plants containing the latest and best types of equipment. This is due largely to competition which has become keener every year until, today, only the most efficient plants with good deposits of stone, economical transportation and access to a steady market can show a steady profit.

One of the largest stone producers in the Chicago district, after thoroughly investigating its future market, present costs and the possibility of lowering these costs, realized the need for increased efficiency and, accordingly, built a complete new plant. This company, the Elmhurst-Chicago Stone Co., of Elmhurst, Ill., has, at present, a splendid example of modern engineering practice in the design of its new plant. Increased capacity, provision for expansion, and unusual flexibility of the conveying and screening equipments are its outstanding features.



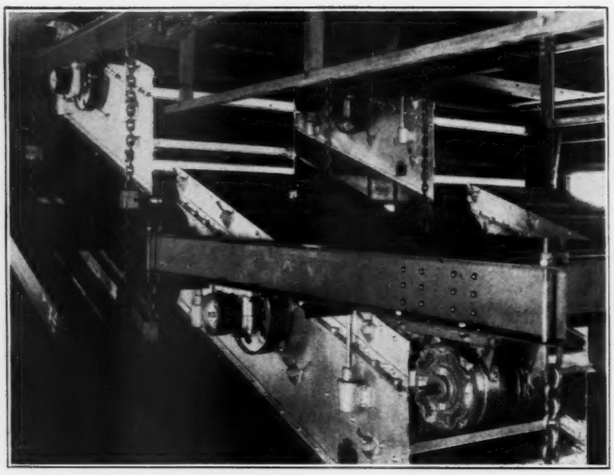
The two Elmhurst-Chicago cone crushers.

Vibrating sizing screens and chutes at Elmhurst-Chicago stone plant.

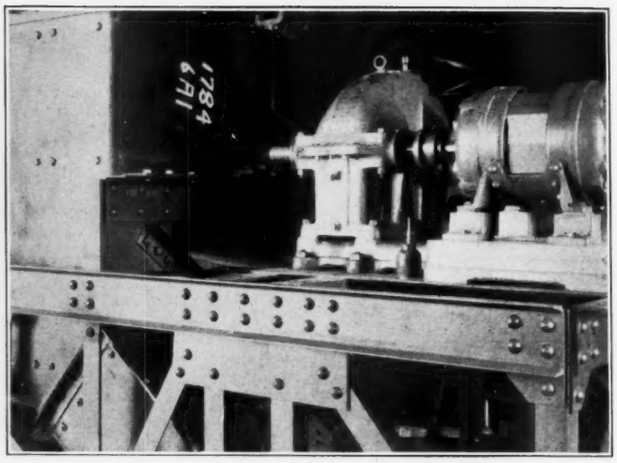
Quarry operations, such as drilling, blasting and loading are conventional. A double incline to the primary crusher spider is of interest, however, because the dumping of one car on each side tends to load the crushing chamber evenly. The McCully 36-in. No. 18 gyratory crusher, discharges to a 36-in. Stephenson-Adamson pan conveyor. The latter, in turn, feeds a 36-in. belt conveyor leading to the top of the new secondary crushing building where it discharges into a 500-ton-capacity steel surge bin.

This bin decreases operating costs by helping to maintain a uniform flow of stone through the scalping screen, secondary crusher and the screening plant. In an emergency it can be filled in a little over an hour and will then keep the plant operating steadily for about two hours. The bin is of steel-plate construction and is supported on extra heavy structural columns.

The bin discharges onto another 36-in. pan feeder similar to the one at the primary crusher. This feeder is driven by a 5-hp. constant-speed Westinghouse motor through a Falk reducer and a Stephens-Adamson J F S Type RG variable-speed reducer



Vibrating screens at Elmhurst-Chicago plant. Note weighted-chain suspension.



Speed-reducer drive of conveyor to screen at Elmhurst-Chicago operations.

which can be adjusted for any speed between 24 and 144 r.p.m., enabling the operator to deliver any tonnage between 50 and 350 tons per hour. This control feature is of great value in regulating the maximum volume when different sizes of stone are produced.

The discharge from the variable-speed feeder is scalped normally over a Stephens-Adamson 5-ft. by 8-ft. single-deck vibrator screen. The oversize is crushed by a 5½-ft. Symons cone secondary crusher set for a 2½-in. maximum. As an emergency feature, a bar grizzly has been mounted alongside the screen on a shuttle frame, arranged so that it is a simple matter to roll the grizzly into place over the crusher whenever screen panels are being changed or adjustments made.

A 30-in. inclined belt conveyor carries the crusher discharge and the fines from the scalping screen or bar grizzly to the new screen house on the bank above the quarry.

In the screen house, the stone first passes over a series of three Stephens-Adamson vibrator screens called the "oversize screens." The first two are 4-ft. by 8-ft. double-deck, while the third is 3-ft. by 6-ft. triple-deck. The oversize and second size from the first screen go to the second screen. The oversize from this goes through a chute to two bins for large stone, while the second size goes to the third screen. The three decks of the third screen deliver through chutes into any three of the six bins beneath or onto a conveyor to the recrushers.

The fines from the first two screens are chuted to a 24-in. inclined belt conveyor feeding the six "undersize" screens at the other end of the screen house. It discharges through a split chute to two rows of three Stephens-Adamson vibrator screens.

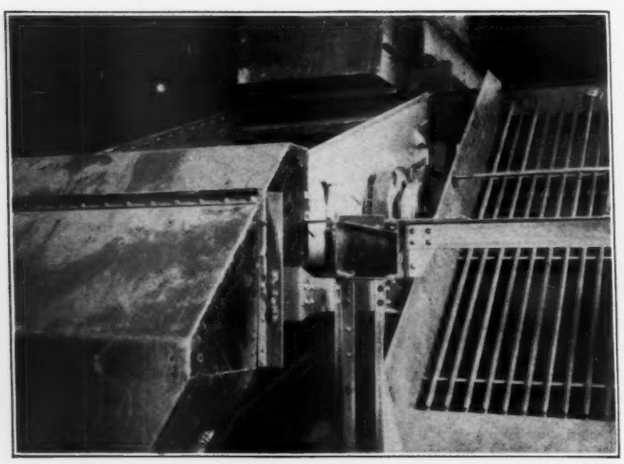
The throughs from the first two pairs go to either of two fine-stone bins, while the oversizes go to the two triple-deck vibrators. The two intermediate sizes from these go through chutes to any of four bins beneath. The fines also go to separate bins. The oversize from the triple-deck screens can be chuted either into bins or onto the same 24-in. inclined belt conveyor which feeds from the triple-deck oversize screen to the recrushers.

The two reduction units are 3-ft. and 4-ft. Symons cone crushers. These discharge onto a 24-in. Stephens-Adamson belt feeder which, in turn, feeds a 24-in. inclined belt conveyor. This discharges onto the 30-in. main conveyor from the secondary crusher.

The reinforced concrete structure beneath the screen house consists of twelve separate storage and delivery bins, each of 300-tons capacity. They are in two rows and discharge through sliding gates into either railroad cars or trucks. The spout system feeding to these bins is an interesting feature of the plant. Their arrangement is so flexible that almost any size or mixture of sizes can be fed to any bin. The screens can be adjusted so that a majority of any size desired can be produced when necessary.

The entire system, from primary crusher to the final sizing screens, is started from a control room located on one of the upper floors of the screening building. Each unit starts up automatically after the preceding unit is up to speed until the entire plant is running.

The secondary crusher building, the screening building, the two main conveyors and the short return conveyor are all of structural-steel construction on concrete foundations and are covered with pro-



Screen feeding secondary crusher. Elmhurst-Chicago Stone Co.

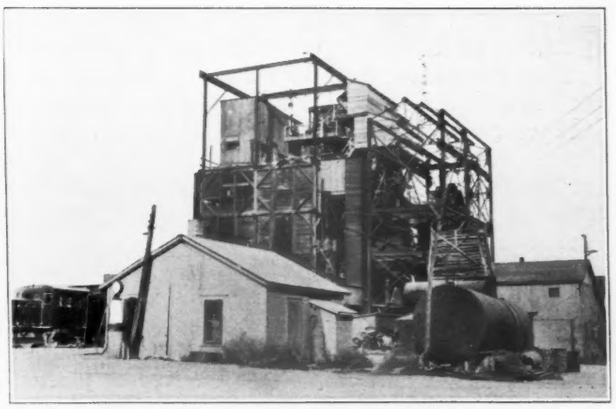
tected corrugated metal. The conveyor galleries are floored with precast, reinforced concrete floor slabs which extend across the entire width of the gallery and are designed to fit closely at joints. The slabs have channel section reinforcing and were made entirely at the company's block plant.

Mohawk Limestone Products Co.

An interesting development was the installation by the Mohawk Limestone Products Co. at its Jordanville, N. Y., plant of a very modern system for the storage and packing of lime and pulverized limestone. The original plant which produced crushed stone went into operation in 1925. This has been added to and improved from time to time whenever greater production or a wider variety of products were required.

The quarrying and crushing and screening methods used are more or less conventional. The method of storage, however, is one not commonly used in this field. A belt conveyor with a traveling tripper discharges any size of stone desired into a covered storage building. Rehandling and recovering of the stored material is done by an overhead traveling crane which feeds back onto a belt conveyor. The pulverized limestone goes to a rotary drier from which it is elevated to a feed bin. This discharges to a ball mill which discharges onto two vibrating screens. The tailings are returned to the mill while the finished material is pumped to one of three concrete storage silos.

The kiln stone is recovered from storage in the same manner and goes to a rotary kiln with a capacity of 5 t.p.h. A drag chain conveyor and elevator take the calcined stone to a rotary cooler from which it goes to a feed bin. The material then goes to a 1-ton-capacity batch hydrator which feeds to an air-separator and pulverizer. The finished lime goes either to a bag packer or through a Fuller-Kinyon pumping system to the other two of the three storage silos. These silos have a total storage capacity of 7,000 tons. Both the lime and pulverized limestone are recovered from the silos by a Fuller-Kinyon pumping system which feeds to the packing and bulk-loading plants.



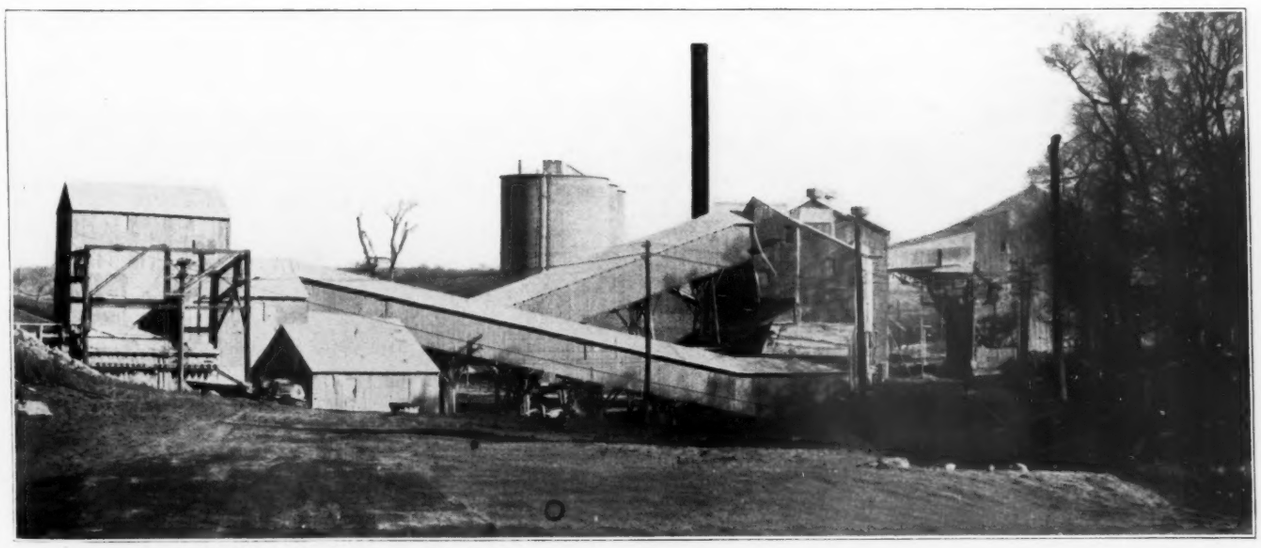
This fuel-oil storage tank at the Beam plant holds 12,000 gallons.

C. C. Beam, Inc.

An interesting example of the incorporation of modern equipment and good engineering in an old established limestone plant can be found at Melvin, Ohio. In 1930, C. C. Beam, Inc., producer of crushed stone in this territory since 1904, completed the rebuilding of its entire plant.

Twelve vibrating screens, capable of screening and washing every grade of material in the 1,500-ton daily output, feature the rebuilt plant. This is one of the largest installations of vibrating screens in this region and is the first major installation of the new Allis-Chalmers vibrating screens which were announced early in 1930.

A new addition was built to accommodate the primary scalping and the classifying screens as well as the secondary crushers and the primary-crusher elevator. This building has three levels, access to each level being gained by steel and concrete stairways. A crane, equipped with a hand-operated chain-block, travels on rails mounted on the columns just beneath the roof trusses. Access to the equipment on any level is made by removing the sections of floor-



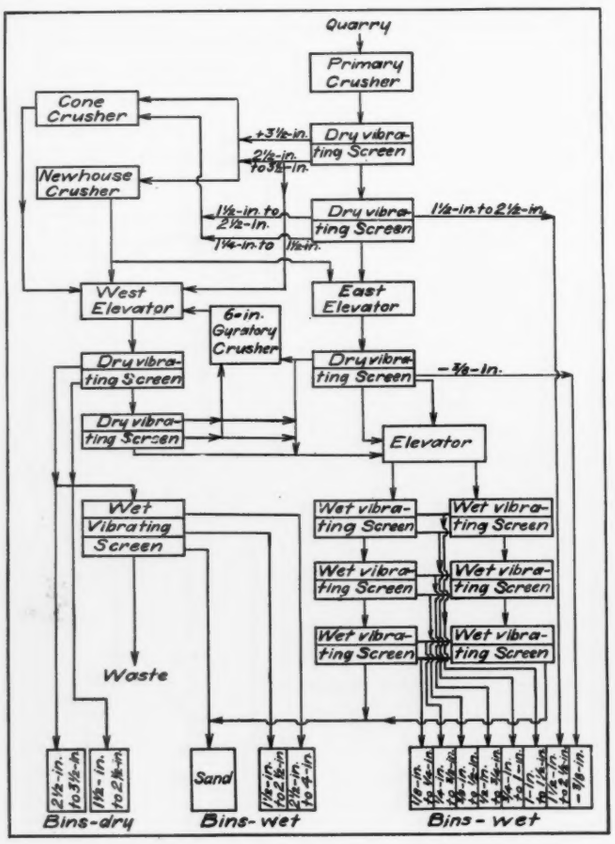
Plant of Mohawk Limestone Products Co. viewed from quarry. The new concrete-storage silos are in the center background.

ing on each level. These sections are of timber planking in convenient sizes for ease in handling.

New floors, too, were added to the original building to provide space for the washing screens and the two plant elevators. Above the top floor, a steel framework carries another traveling crane. Floors in this building are built in removable sections to provide access for the crane to the equipment on the lower levels.

An interesting feature of the Beam plant is its arrangement of the vibrating screens and other materials-handling equipment. Circulating loads on the elevators, so common in the average crushed-stone plant where classification takes place in screens on the top-most floor, are eliminated. Two vibrating screens, located in the new addition, reject oversize material and classify the crushed rock, sending these grades to the two secondary crushers or to the two plant elevators. In other words, before reaching the main classifying and washing screens, the materials are entirely crushed to the desired sizes. Consequently, no rejects are returned, thus freeing the two plant elevators of circulating loads.

An examination of the flow sheet of this plant will reveal the exceptional flexibility of the processing equipment. By the use of two elevators, the classification of dry materials is divided into two branches. Spoutings are so arranged that, in the event of a breakdown in either elevator or in the vibrating screens of either branch, the flow of material can be re-directed, using the remaining equipment. All of the vibrating screens are 4-ft. by 8-ft.



Flow-sheet of C. C. Beam plant.

in size, with the screen cloth mounted in sashes which are quickly interchangeable.

Provision has been made to permit the washing of all sizes of crushed materials, from ⅛-in. to 4-in. sizes. An elevator, receiving classified material from both branches of the dry vibrating screens, transports this material to the top floor of the washing building, where it is divided onto the first pair of washing screens. Three banks of Allis-Chalmers double-deck screens wash and classify all sizes of ⅛-in. to 2½-in. material. The larger sizes of material are washed on a triple-deck screen which receives them direct from the dry screens of the west elevator branch.

The crushing equipment consists of a primary and two secondary crushers. In addition to the latter crushers, a third unit is used for recrushing, because of an occasional demand for large quantities of the smaller sizes of crushed stone.

Electrically-welded downspouts and chutes are used throughout the plant, providing a most durable yet economical method of handling the material flow. All of the sections are cut from steel plates by means of oxy-acetylene torches, then placed into position and permanently welded by means of a portable electric arc-welder. Stone linings are used wherever excessive wear is likely to occur, and all downspouts are equipped with stone-lined shoulders to break up the force of falling material. Each downspout is extended on the bottom, providing a dead end which quickly fills with stone, thereby eliminating wear. Special attention has been given the design of the chutes which feed the vibrating screen decks. A vertical downspout is used, with a deflecting action, tending to send the material against the natural flow of the screen to prevent rolling.

Provision has been made for fire protection, by taking advantage of the two 6-in. risers which carry the fresh-water supply to the washing screens on the top floors of the building. These risers are so placed that 75-ft. lengths of 1½-in. hose have access to any portion of the floor levels upon which they are installed. Each hose outlet is provided with a valve at the standpipe connection and each hose line is equipped with an approved nozzle.

A detailed description of this plant was published in the Dec. 3, 1930, issue of PIT AND QUARRY, entitled "Redesign Ohio Crushed Stone Plant to Eliminate Circulating Loads."

New York Trap Rock Corp.

The new plant of the New York Trap Rock Corp. at Clinton Point, N. Y., is one of the most important of the year or in the history of the crushed stone industry. This plant incorporates the most approved methods of operation and is of the most permanent type of construction throughout. Its present capacity is 600 tons per hour but the design is such that this capacity can be doubled without loss of production or any plant changes outside of the installation of a few pieces of additional equipment for which space has been left. A complete, illustrated description of this plant is presented elsewhere in this issue.

Cement Industry Concentrates Upon the Improvement of Existing Plants

THE year 1930 is considered by many to have been one of the most trying in the recent history of the cement industry. These opinions are based on a decrease in production, low prices which prevailed during the first few months, the fact that no new plants were built during the year, and various other reasons. It is true that there was a slight decrease in production below the previous year but this did not begin to compare with the slackened business conditions that prevailed in industry in general.

The fact that no new plants were built and that very few are even contemplated for the coming year is an indication that the cement industry is on its way to a healthier condition. The industry has been greatly overbuilt in the past because too many new plants were built for the majority of which there was no economic justification. These new plants are largely responsible for the gradual decrease in the ratio of production to capacity which has taken place in recent years and for the low prices which have made it difficult for the average plant to operate at a reasonable profit.

The very conditions which discouraged the building of new plants were responsible for the concentration of effort on the part of cement-plant engineers and operators on the improvement of existing plants. These improvements resulted in increased efficiency and economy of operation and in the production of a higher quality of cement. The building of "wild-cat" cement plants solely for speculative purposes has been discouraged, for the present at least, and practically all the improvements planned for the coming year are proposed by established operators.

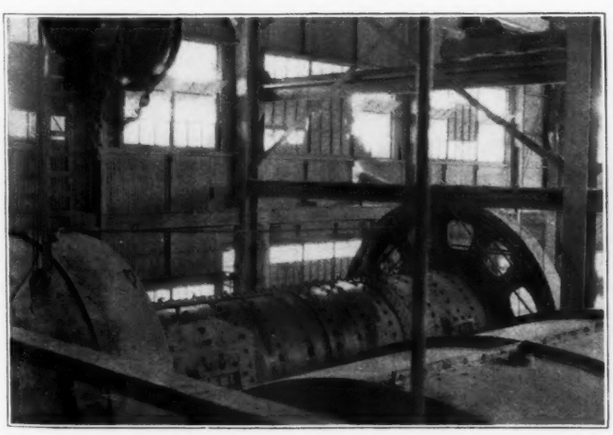
The low prices which prevailed during the early part of the year were due, in part, to destructive competition and, in part, to the importation of foreign cements which affected prices out of all proportion to the relatively small amount imported. The tariff now imposed on these cements, although not as high as it should be, is having some effect on bringing prices back to a reasonable level.

The trend toward the use of the wet process continued during the year and a number of plants abandoned the dry process. Other refinements also took place, including the installation of slurry filters, dust collectors, air separators and other equipment for the production of a consistently higher grade of cement. Many plants also made changes which provided for the manufacture of high-early-strength and quick-setting cements. As a result, the average cement to-day has reached a new high level of quality.

PIT AND QUARRY has again kept its readers informed of all new developments in the cement industry as they occurred. Many of the major plant improvements were written up in detail by staff members who made personal visits to the plants for this information. A review of some of the outstanding developments is given below.

Arkansas Portland Cement Co.

The last cement plant to be built in this country was that of the Arkansas Portland Cement Co. at Okay, Ark. Although this plant went into operation late in 1929 it did not operate steadily at capacity until early in 1930. For the reason that it went into operation too late to be included in the 1929 cement-plant review, it is treated in this review as a 1930 plant. A complete description of this plant was published in the July 2, 1930, issue of PIT AND QUARRY but several changes have been made since that time. A set of Oliver-United slurry filters has been installed and the locomotive-and-car haulage system in the quarry has been replaced with a Woodford remote-controlled electric-haulage system. The latter installation is completely described



Finish-grinding mill at Arkansas plant. Part of the raw mill is shown in foreground.

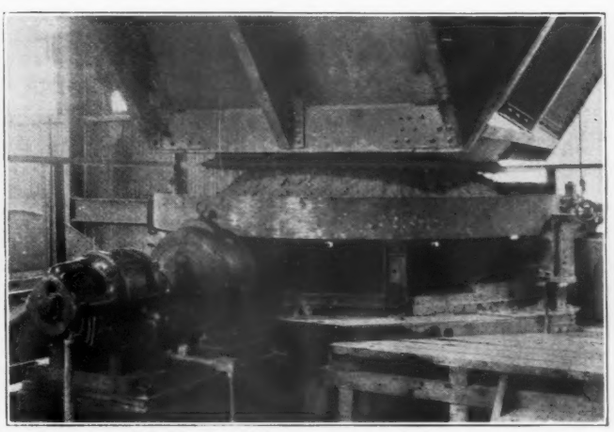
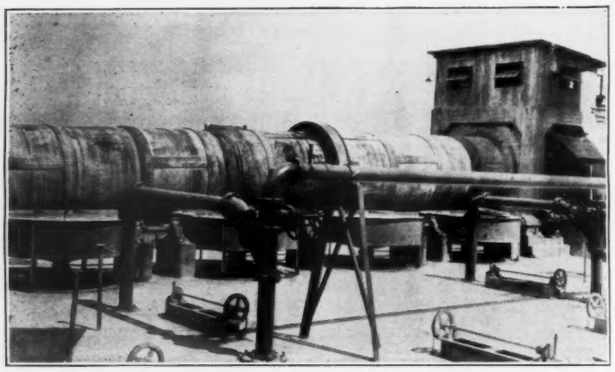


Table feeder to Arkansas plant raw mill showing motor and speed reducer drive.

in another article in this issue. The present capacity of the plant is about 3,000 bbl. per day.

The principal feature of this plant is its simplicity and compactness. Ample space was left for future enlargements and provisions were made in the design so that any future refinements of operation can be installed without necessitating costly reconstruction of the plant. The plant is very simple from a mechanical standpoint. There are only four principal machines: the crusher, the two Compeb mills, and the kiln. Outside the pack-house, only one screw-conveyor, one bucket elevator, one drag-chain conveyor and one belt conveyor are used.



Quadruple agitator above slurry tank and feed end of kiln at Arkansas plant.

Stone is loaded in the quarry by a Marion 2½-cu. yd. electric shovel, and shale by a Bucyrus-Erie ¾-cu. yd. gasoline-air shovel. Both materials are hauled to the plant by the Woodford electric-haulage system using three 10-cu. yd. capacity cars. The shale discharges to a hopper from which a belt conveyor feeds to open storage. The stone is dumped into a hopper from which a Stephens-Adamson feeder discharges it to the Pennsylvania No. 60 swing-hammer mill. A bucket elevator discharges to the storage building from which both the stone and shale are rehandled by an overhead crane.

The shale and stone are roughly proportioned by the crane into a bin which feeds through a table feeder into a pug mill. This mill, in turn, discharges the slurry to an Allis-Chalmers 7-ft. by 40-ft. three-compartment Compeb mill. Two Wilfley pumps feed the slurry to six batching tanks that are equipped with F. L. Smidth mechanical-and-air agitators. Two more pumps feed the slurry, in the desired proportions, from these tanks to a 1,425-bbl.-capacity slurry-mixing tank with a Smidth quadruple agitator. After correction, the slurry is transferred to a 5,640-bbl. open-storage tank which has an F. L. Smidth three-paddle traveling agitator.

Two Wilfley pumps supply the slurry from storage to a ferris-wheel feeder to the three-unit Oliver-United slurry feeder. This, in turn, discharges through openings in the kiln shell into the single Allis-Chalmers rotary kiln which is 11 ft. 6 in. in diameter and 300 ft. long. The red-hot clinker is discharged to a water-cooled drag-chain conveyor feeding an elevator which discharges to storage in the same building used for shale and stone storage.

Clinker and gypsum are fed from storage to a two-compartment bin from which they are proportioned into the Allis-Chalmers three-compartment Compeb finish-grinding mill. Two Fuller-Kinyon pumps feed to storage in twelve concrete silos with a total capacity of 230,000 bbl. At the time the filters were installed a second finish-grinding mill was installed to handle the increased output of the kiln and to provide greater grinding capacity. Two Smidth Exbiners feed the cement from the silos to a series of conveyors and elevators to the packing building for shipment.

The plant was designed by and built under the supervision of Paul C. Van Zandt who, at that time, was chief engineer of the Ideal Cement Co. The major part of the plant equipment was furnished by the Allis-Chalmers Mfg. Co. The Link-Belt Co. furnished most of the conveyor equipment. Speed-reducer drives are used in this plant wherever possible.

Keystone Portland Cement Co.

The plant of the Keystone Portland Cement Co., at Bath, Pa., when it went into operation early in 1928, had a capacity of 3,600 bbl. per day and was considered one of the most up-to-date plants in the country. Since that time, the company has carried out an enlargement program which was completed in the spring of 1930 and has doubled the capacity of the plant. The improvements include a new system of hauling raw material to the plant, the installation of a second pair of kilns, the erection of an additional group of cement-storage silos and two new pack-houses, and a number of minor changes and additions.

The quarry at this plant originally had a locomotive-haulage system to the plant but, when the quarry was deepened, this became impractical. A balanced-type hoist is now used to haul the cars up an incline from the quarry. The locomotives now are used to handle the cars to and from both ends of the incline. The crushing plant has also been changed and the cars now dump into the Pennsylvania 36-in. by 60-in. single-roll crusher. A pan feeder carries the crushed stone to a Pennsylvania SXT-14 swing-hammermill for further reduction. A belt conveyor takes the stone to the storage building where it is distributed by a portable tripper.

Raw grinding is done by four 7-ft. by 42-ft. 8-in. Polysius three-compartment mills. The slurry is pumped from the mills to twelve concrete slurry-mixing tanks, then to four blending tanks and, finally, to the kiln-feed tanks over the four Polysius 250-ft. Solo kilns. These kilns, in addition to burning, cool the clinker. They are coal-fired.

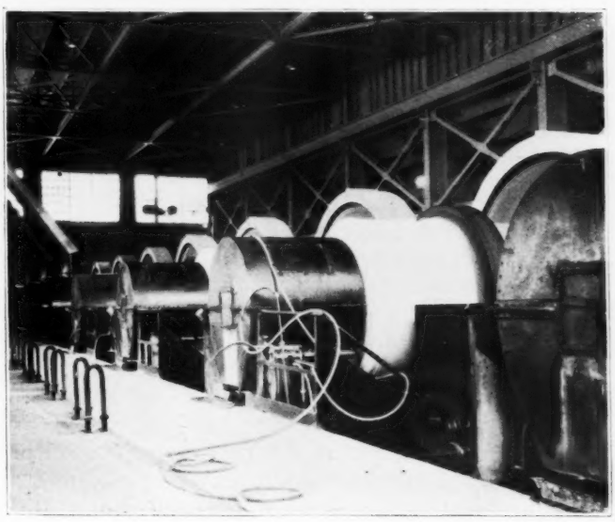
The electrical control of the slurry feeders is one of the most interesting of the many new features added to this plant. This is done by Selsyn generators on the drive shafts of the kiln and slurry-feeder motors, both of which are excited from the same source. A Selsyn differential motor between the stator connections of these two generators keeps them in synchronism. In this way the flow of slurry is kept in proportion to the kiln speed.

The cooled clinker is carried by pan conveyors to and from a double-roll crusher and by elevator

Airplane view of enlarged plant of Keystone Portland Cement Co. Incline from quarry is in left foreground.

either into storage or to the finish mill room. The four Solo finish-grinding mills are 7 ft. in diameter by 42 ft. 8 in. long. From the raw-grinding department through the finish-grinding, practically every installation is now double its original size. Where the original plant had six slurry agitating tanks there are now twelve. The two original kilns and stacks were supplemented by two more of the same size. Allowance for all these additions was provided in the original design of the plant and, as a result, the expense and lost operating time due to the enlargement of the plant were remarkably small.

The cement is transported by two Fuller-Kinyon pumps to the cement-storage silos. The original installation consisted of a ten-silo storage unit with a capacity of roughly 160,000 bbl., and a pack-house with four 3-tube Bates packers. Since that time, another unit of ten silos of the same size, and a third unit of nineteen silos with a capacity of about 480,000 bbl., have been added, giving a total storage capacity of 800,000 bbl. of cement. Another packer was added to the original building and two additional pack-houses were built with two packers each. The present system of storage and packing is one of the largest in existence and is certainly one of the most flexible.



Interior of mill room of Keystone Portland Cement Co. with raw grinding mills in foreground.

Great Lakes Portland Cement Co.

One of the most interesting developments of the year was the construction of a complete clinker-grinding and cement-storage-and-packing plant by the Great Lakes Portland Cement Co. at Cleveland, Ohio. The original installation, several years ago, consisted of a cement-storage-and-packing plant for the distribution of cement from the company's plant at Buffalo, N. Y., to the local trade. The changes which were completed last spring consisted of the conversion of some of the existing cement-storage silos into clinker silos and the construction of a finish-grinding building. All buildings are of the most modern type. All footings and silos are of concrete while the buildings have steel frames with corrugated-asbestos siding and roofing.

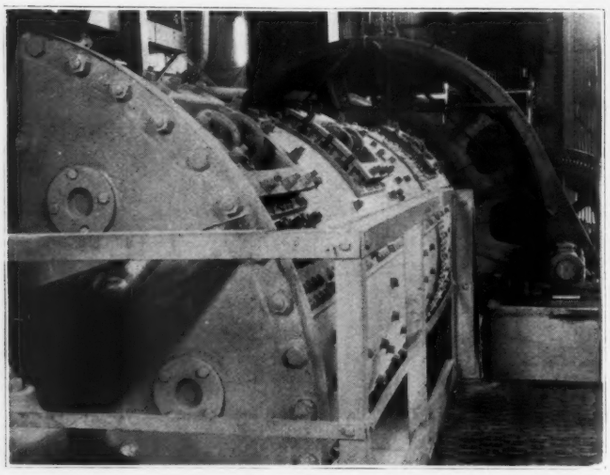
Clinker is received at the plant in self-unloading boats which discharge through an elevator to the two 25,000-bbl.-capacity storage silos. Clinker is withdrawn from storage by two drag-chain conveyors, a belt conveyor and bucket elevator to a 90-ton-capacity feed bin over the grinding mill. Gypsum is unloaded from hopper cars and elevated to another 90-ton-capacity feed bin. The clinker and gypsum are fed, in the desired proportion, by screw feeders onto a 36-in. table feeder. This discharges to the Allis-Chalmers 8-ft. by 30-ft. three-compartment Compeb mill.

A screw conveyor and elevator feed the product of this mill into a 16-ft. Sturtevant air separator. The coarse cement is returned, by a screw conveyor, to the feed end of the mill for regrinding. The fines from the air separator are taken by a series of screw conveyors and elevators to the cement-stor-

The Great Lakes Portland Cement Co. plant with cement silos at right and new grinding mill at left.

age silos. All the elevators and conveyors in the mill building and the mill discharge hood are connected to a Norblo, 4-tank filter-type dust-collecting unit. This discharges to the same conveyors to storage.

The six concrete cement-storage silos with their two interstices have a total capacity of 50,000 bbl. Cement is withdrawn from these silos by screw conveyors and elevated to the top floor of the packing building into hoppers over two Bates packers which handle car shipments. The screw conveyors that feed these hoppers can be reversed to discharge to hoppers over three Bates packers in the truck-shipping building. These packers discharge onto individual belt conveyors which can be raised or lowered to any desired height to discharge onto trucks. All elevators and conveyors in these departments are connected to a Norblo five-compartment arrestor-type dust collector, and the packers to a Norblo two-compartment collector of the same type. The car-loading unit is also equipped for the bulk-loading of cement. Hum-mer vibrating screens over each packer insure removal of any coarse material that may have passed the air separator.

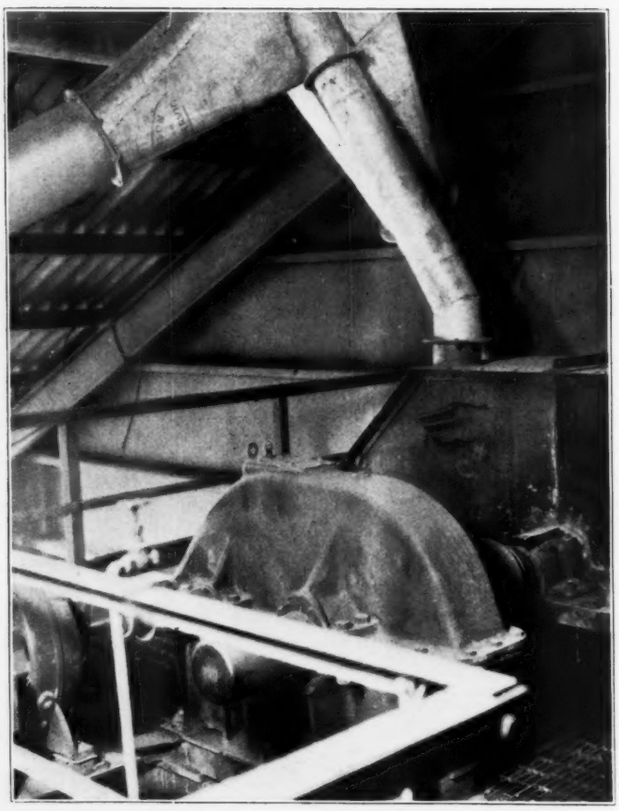


The finish-grinding mill in the new grinding plant of the Great Lakes Portland Cement Co.

All elevators and conveyors in this plant are steel or concrete enclosed and are driven through speed reducers. The mill building and silos were designed by the Burrell Engineering and Construction Co. The remainder of the plant was designed by the cement company's engineers. The capacity of this plant is about 3,000 bbl. of cement in a 24-hour day. A complete laboratory is maintained for making all necessary tests.

Missouri Portland Cement Co.

The new finish-grinding plant of the Missouri Portland Cement Co. at St. Louis, Mo., which was completely described and illustrated in the Oct. 22, 1930, issue of PIT AND QUARRY, proved one of the most interesting developments of the year in the cement industry. This plant uses, perhaps to a greater extent than any other existing plant, the advantages of air separation in finish grinding.



Reducer drive for elevator to air separator at Missouri plant. Note enlarged joint in dust-collector pipe.

Clinker and gypsum are fed to their respective mill-feed bins which have sufficient capacity so that no loading need be done at night. The two Allis-Chalmers 9½-ft. by 8-ft. by 40-ft. four-compartment Compeb mills are fed from the bins by Schaffer Poidometers. Each mill is connected to two Sturtevant 16-ft. air separators, as shown in the accompanying drawing.

The material ground in the first compartment of the mill passes through a slotted end-grate and a series of holes in the shell of the mill into a stationary mill-dust shell. This discharges through a screw conveyor and elevator to the first of the two

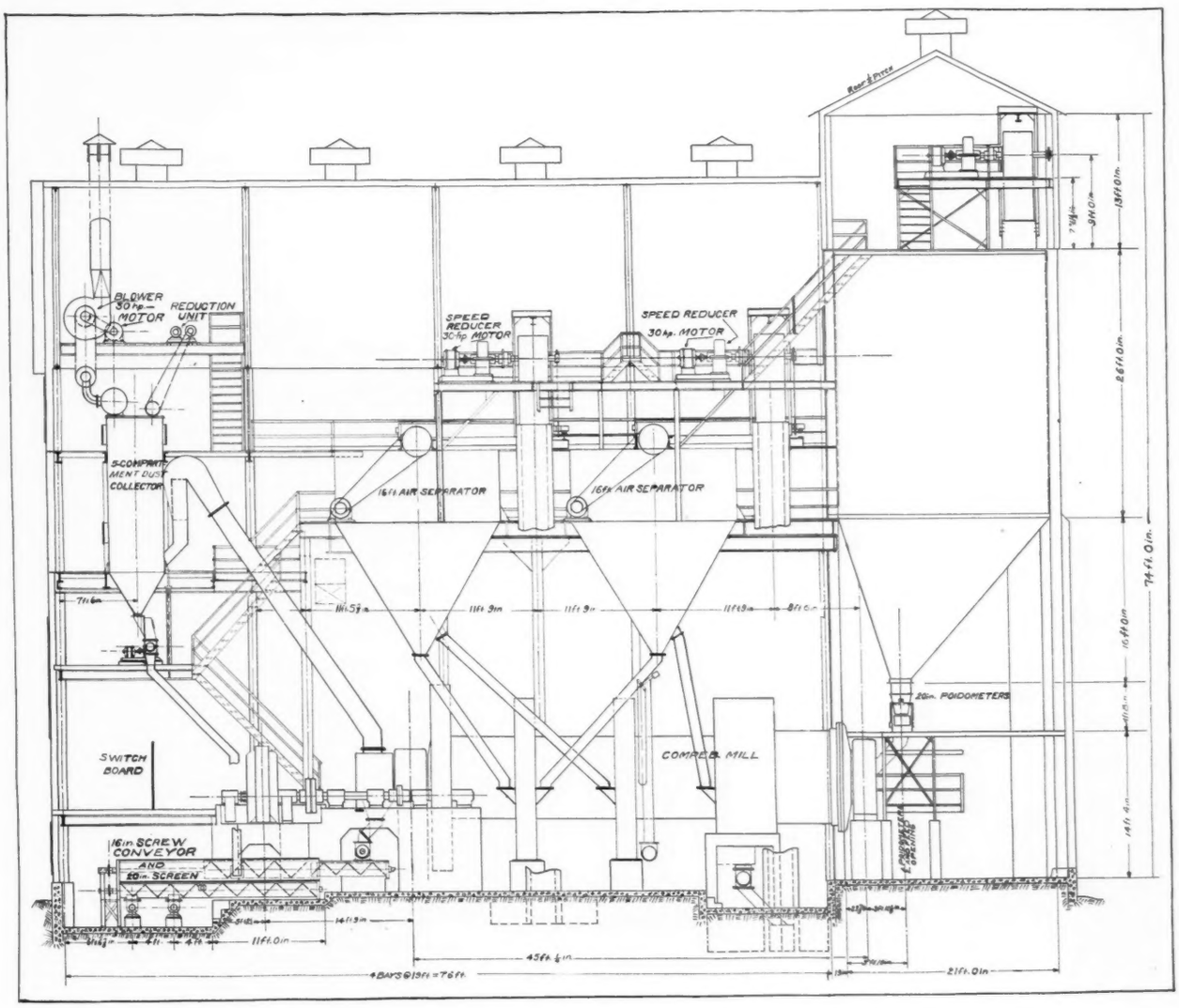
Two of the 16-ft. air separators at Missouri plant. Screw conveyor and elevator feed also visible.

separators. The tailings from this separator discharge to the second compartment of the mill while the fines go to the fourth compartment. The material from the second compartment discharges in a similar manner to the second air separator the tailings from which feed to the third compartment and the fines to the fourth compartment of the mill.

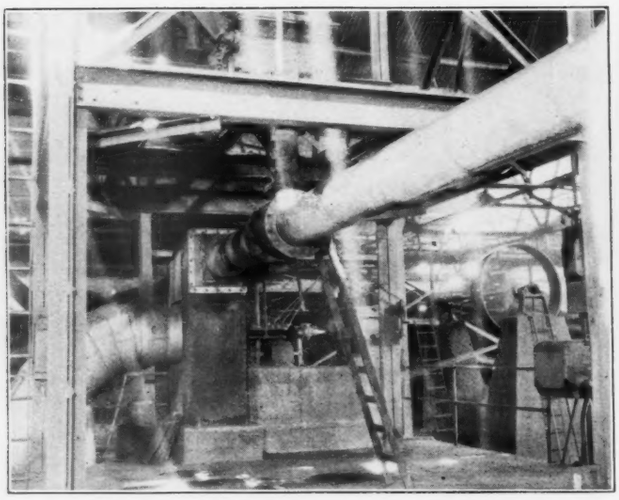
When conditions make it advisable, this flow can be changed so that the fines from the first separator discharge to the elevator to the second separator instead of to the fourth compartment of the mill. Otherwise the flow is identical. This choice of methods, together with the flexible control of the separators which gives them a wide range in the size of the separated material, makes it possible to allow for any variation in the size of material fed to the mills and to change the grading of the finished product whenever desired.

The first compartment of each mill is loaded with 4-in. maximum steel balls and the last three compartments with Allis-Chalmers 1¼-in., ⅞-in., and ¾-in. Concavex respectively. The finished cement is fed by screw conveyors to two Fuller-Kinyon pumps which discharge either to a stock-house of 200,000-bbl. capacity or to concrete silo storage of 184,000-bbl. capacity.

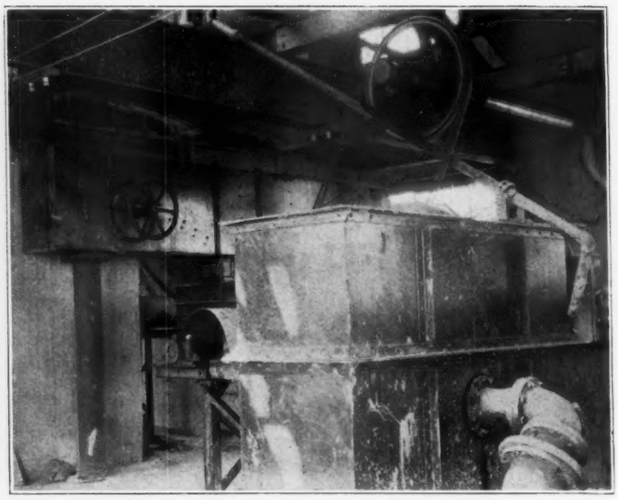
The dust-collecting system in the new mill building is also of interest. Each of the two Compeb



Sectional vertical elevation of new finish mill at Missouri Portland Cement Co. plant, St. Louis, Mo.



Coal-feed fan with feeder above. Wolverine cement plant.



The Ferris-wheel slurry feeder used at the Wolverine plant.

mills has an Allis-Chalmers five-compartment bay-type dust collector. These collect dust from the top of the clinker elevators, from the Poidometers, from the elevators feeding the separators and from the discharge ends of the mills. Both dust collectors discharge into the mill stream at the screw conveyor that feeds the Fuller-Kinyon pumps.

The intake lines to the dust collectors are of the zigzag type. At each top joint there is an enlarged elbow which decreases the velocity of the air stream and allows the coarser particles of dust to drop back against the air stream into the grinding circuit. For example, the coarse dust collected from the clinker elevator, Poidometers and the elevator to the first air separator drops back into the elevator to the second separator. This system prevents any coarse material from entering the flow of finished material from the mills and eliminates the usual necessity for cleaning out the dust-collector pipes.

The entire operation is of the most modern type. The mill building has a superstructure of structural steel with corrugated-asbestos siding and roofing and a concrete foundation. All stairways, floors and bins, are of steel and all elevators are steel-enclosed. All drives are enclosed, speed reducers being used wherever possible. All of the concrete was poured, the machinery installed, and the electrical work done by the company's forces.

Kiln and feeder building at the Wolverine plant. The two feed tanks are seen in the center.

Wolverine Portland Cement Co.

A number of the smaller cement plants made changes or improvements during the year to keep them in step with the larger plants in efficiency of operation and quality of product. One of these was the plant of the Wolverine Portland Cement Co. at Quincy, Mich., in which were installed a 305-ft. kiln and the necessary accessories to replace seven 120-ft. kilns. This is one of the few remaining plants to use marl as a raw material, and is one of the pioneer cement plants in the Middle West. The present capacity of this plant is 1,500 bbl. per day.

The marl, which is dredged from the bed of a lake, is pumped from barges to six steel storage tanks. Clay, in the correct proportion, is added to the marl as it flows from these tanks to a pug mill. The slurry then goes to tube mills for fine grinding and from these to fourteen steel storage tanks in the kiln building. A screw conveyor takes the slurry from these tanks to the new kiln-feed building.

The screw conveyor feeds a bucket elevator which discharges to the concrete kiln-feed tank. This tank is equipped with a Manitowoc Minogue mechanical-and-air agitator. A second elevator feeds the slurry from this tank to a ferris-wheel-type slurry feeder which is driven by a counter-weighted rope-drive from a sheave encircling the kiln. The Allis-Chalmers kiln is 305 ft. long by 10 ft. in diameter and is fitted with a seal ring and an F. L. Smidth chain system for breaking up the slurry. The clinker from the kiln is handled to storage from which it is fed to nine Griffin mills and then to two tube mills which operate in closed circuit with a Gayco 14-ft. air separator.

The 100-ft. concrete kiln stack, the two concrete elevator casings and the slurry storage tank, were built by the Rust Engineering Co. All other construction work and the installation of the new equipment were done by the company.

Scores of Ready-Mixed Concrete Plants Built in Last Twelve Months

THE growth of the ready-mixed concrete industry during the past year was tremendous but, despite this fact, the field is as yet almost untouched and there is apparently an unlimited opportunity for the erection of new plants and the expansion of those already in existence. In past years, plants were considered feasible only in the larger cities and industrial centers but, during 1930, the greatest expansion in the industry was in cities of medium size, some of less than 25,000 population.

Many plants were built for the production of plant-mixed concrete and many more for batching materials to be mixed in transit. The trend, however, was toward the combination of these two systems each of which has its advantages for different purposes and conditions. As in the past, most of the new plants are operated by aggregate producers, either as parts of aggregate plants or as separate companies; or by independent companies operating under agreements with producers. The number of plants operated by material dealers and contractors remained in the minority. Gravel is used as aggregate in most of the new plants.

Five of the most typical plants of the year have been selected and are reviewed below. These reflect the tendencies in the industry and the trend in plant equipment. Each of these plants was designed to meet a specific market condition.

Cayll & Barrett, Inc.

A Wisconsin producer demonstrated that a small city affords an opportunity for business in central-mixed concrete. By a vigorous campaign throughout the year, this organization not only secured the bulk of the building-construction business, but received a substantial portion of the city and county concrete business.

An outstanding feature of the Cayll & Barrett, Inc., plant at Waukesha, Wis., is its location and the manner in which aggregates are secured and handled. This plant is located on a property under lease, belonging to the Waukesha Lime & Stone Co. The stock-piles of the latter company are accessible to the concrete plant through a tunnel-conveyor system. Under agreement, the Waukesha company maintains the stock-piles, and each month settlement is made for the aggregates used on the basis of the concrete sales. At the end of each year, an audit is made of the company's books and any differences are adjusted.

From a mechanical point of view, the plant is well designed and employs the latest equipment. The Butler Bin Co. aggregate hopper is of the standard two-story design providing for the batching equipment beneath the hopper gates. It has a storage capacity of 110 cu. yd. Cement is received in truckloads or in carload shipments from a sidetrack. Either supply is received in a hopper placed below ground-level from which a bucket elevator carries it to an auxiliary hopper above the cement batcher. When the auxiliary hopper is filled, an overflow pipe allows the cement to return to a 100-ton-capacity storage hopper. When desired, this reserve supply is again sent to the auxiliary hopper via the bucket elevator.

The batching equipment consists of a double-compartment aggregate weighing-hopper and a separate cement weighing-hopper. Regulation beam scales equipped with tell-tale dials are used on both batchers. Weighed materials are spouted either to a Rex 1-cu. yd. mixer beneath or to dry-batch trucks for delivery of dry-batched materials to mixers located on jobs.

Several trucks with Clinton tank bodies are used for the delivery of the ready-mixed concrete.

A complete story of this plant was published in the Oct. 22, 1930, issue of PIT AND QUARRY, entitled "Finds Small City Offers Big Opportunity in Ready-Mixed Concrete Field."

Ready Mixed Concrete Co.

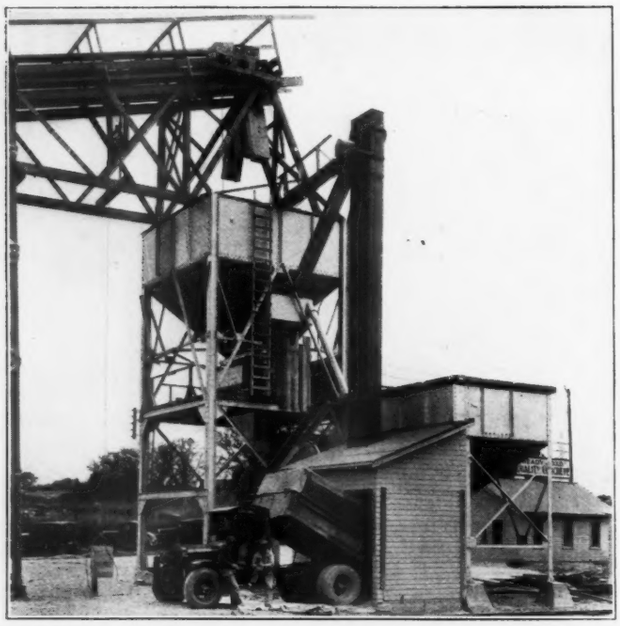
Another organization, the Ready Mixed Concrete Co., of Omaha, Neb., went into the transit-mixed concrete business during the past year, in addition to its already successful central-mixing business. Both products are sold to their best advantage, with the transit-mixed material especially adapted for the long-distance and quick-hardening concrete deliveries.

The new transit-mixing equipment is placed adjacent to the central mixing plant, and receives its aggregate supply from the same source—a stiff-leg derrick and clamshell bucket operated near an adjoining stock-pile. The sand-gravel hopper has a capacity of 75 cu. yd. in two compartments, each with a lever-operated dumping gate.

Cement is handled from a 20-ton hopper suspended from the sand-gravel hopper and is built to accommodate a screw conveyor which supplies cement from the elevator of the central-mixing plant. The flow of cement is controlled by a dumping gate directly above the cement batcher.

An interesting feature of the batch-hopper equipment is the Winslow scale and timing dial, an auxiliary attachment which indicates the approach of the desired weight and finally the correct weight. A great deal of time is saved by this attachment because overweighing is eliminated. The operator has better control of the flow of the material, permitting greater rapidity in handling the batches. The batch hopper is designed for a capacity of 20,000 lb.

The cement batcher is of similar design, having a capacity of 2,500 lb. The discharge hopper is joined with the discharge of the sand-gravel, having a rounded lip which affords easy entrance to the Paris Transit-mixer truck. A small 110-volt vibrator is mounted on the cement discharge hopper to



Bulk-cement truck unloading to receiving hopper at the Cayll & Barrett plant.

prevent sticking of the cement to the discharge chute.

Water is handled by volumetric control from a square steel tank mounted on the batching platform. All hoppers and batch equipment were built by the Butler Bin Co. of Waukesha, Wis.

Three Paris Transit Mixers, each mounted on a GMC truck, and another Paris Transit Mixer on a Mack truck make up the delivery fleet of the company. The former have bodies of 2-cu. yd. capacity and the latter, 3-cu. yd. In this type of mixer, the batched materials are carried dry in the rotating body, while the water is carried in a tank above. The water is not mixed with the materials until arrival on the job.

See PIT AND QUARRY, Nov. 19, 1930, issue, for a complete story of this plant, entitled, "Omaha Firm Sells Both Central-Mixed and Mixed-in-Transit Concrete."

Nashville Ready-Mixed Concrete Co.

One of the most recent additions to the rapidly growing list of concrete central-mixing plants is that of the Nashville Ready-Mixed Concrete & Supply Co., Nashville, Tenn., which went into operation in May of this year. It has a capacity of 400 cu. yd. per day and is one of the few plants in operation having grated materials in the bins. Six grades of combined sand and gravel are stored in the bins above the mixers.

The sand-and-gravel aggregate is handled by cranes from the neighboring plant of the Cumberland River Sand Co. to a hopper. This feeds two bucket elevators, which discharge through a swivel chute into any of six compartments in the 250-ton-capacity Blaw-Knox steel bin above the plant. Four sizes of gravel and two of sand are stored. The use of two elevators insures against delay in case of a breakdown.

Cement is received in bulk and is unloaded from the cars into a ground hopper. This feeds a 56-ft. bucket elevator which discharges into a 3-car-capacity, two-compartment Erie steel bin alongside the aggregate bin.

The plant has two mixers of 1-cu. yd. capacity each. The one commonly used is a T. L. Smith drum-type mixer located on one side of the plant. The gravel for this mixer is weighed in a Blaw-Knox 1-ton-capacity weighing batcher. The sand is measured in a 28-ft. inundator and the cement in a 1,000-lb.-capacity weighing batcher. The measured materials are then discharged into the mixer hopper, where the batch is held until the mixer is ready for another charge. Additional water for the mix is supplied from a tank alongside the inundator.

The second mixer, which is used when additional capacity is required, is a Koehring 28 S. It is adjacent to the other mixer but faces a truck driveway which runs under the building. Water is measured in a Blaw-Knox water-measuring tank, cement in a 1,000-lb.-capacity weighing batcher, and sand and gravel in a 2-ton-capacity, 2-compartment weighing-batcher, both of Blaw-Knox make. The Koehring mixer is used also to mix lime and cement mortars to order. The concrete and mortar are delivered in eight 3-ton pneumatic-tired Mack trucks equipped with Blaw-Knox 2-cu.-yd. agitator bodies.

Liberty Corporation

The Liberty Corp. of Philadelphia, Pa., during the past summer, put into operation a new central-mixing plant which operates in conjunction with its new crushing, screening and dry-batching plants which went into operation at about the same time.

A typical ready-mixed concrete plant in operation.

Fleet of transit-mixed system trucks of the Ready-Mixed Concrete Co.

The combined operations form one of the most complete units of this type in existence. Aggregates are furnished by a river dredge. Blaw-Knox bins, batching equipment and agitator trucks are used.

Boston Transit Mixers, Inc.

One of the best plants of the year for the production of truck-mixed concrete was put into operation by the Boston Transit Mixers, Inc., of Boston, Mass. This plant is of concrete and steel construction throughout and cement is stored in concrete silos. The most modern handling and batching equipment is used, and concrete is mixed and delivered by trucks with Paris Transit Mixer bodies. All conveyors in the plant are speed-reducer driven.

Gypsum Industry Made Progress in 1930 by Effecting Economies

THE gypsum industry, as a whole, has passed through a "breathing spell" during the past year owing to the general decline in building activity. This period has not warranted the construction of new plants nor has it brought about any marked advances in the production or processing of gypsum products.

Regardless of the detrimental effect of the building decline, the industry has made definite progress. Many prominent organizations have made consistent, strenuous efforts to effect greater economy in every department of the business. In other words, house-cleaning has been the order, and without question, the industry has profited through it.

The United States Gypsum Co. has, throughout the year, continued its research work to even a greater extent than in previous years. Considerable effort was made in the development of products possessing acoustic value, and the subject of sound control has received much study on the part of the company's engineers. During the year, as a result of these experiments, acoustical plaster and acoustical tile have been improved and placed on the market. Sound-proof doors have also been perfected. This company, incidentally, completed a new tile plant which is an addition to its mill at Philadelphia, Pa., and is also equipping a metal-lath plant at Warren, Ohio.

Another definite trend during the past year has been the manufacture and sale of kindred building products by the producers of gypsum. Such products as metal lath, lath accessories, insulation board, and insulation lath are now being manufactured by gypsum-producing companies. The sale of these products as well as gypsum products to the dealer enables him to carry a complete line of building supplies all manufactured by the same company, thus reducing his inventory of many lines and insuring a greater degree of service to the consumer. Another advantage gained is in the fact that a carload price can be obtained on a smaller quantity of various materials from one manufacturer than if these products were purchased separately.

From the manufacturer's point of view, the production and sale of allied building products widens his field of revenue and lessens his liability to suffer during periods of building inactivity.

Silesian Lime Plant Has Been Operated by Same Family Since 1752

The Ludwigsdorf lime plant near Gorlitz in Silesia obtains its raw material from a funnel-shaped quarry about 50 meters deep; the stone is quarried principally by hand, and is carried to the plant by 2-cu.m. buckets on a 350-meter aerial tramway. Materials from the quarry are discharged to the proper one of four elevated bunkers, three of which, outside the main plant, receive respectively the overburden and other spoil, the stone for burning to lump lime in a shaft kiln, and the stone for burning in an old ring kiln. Materials from the latter two bunkers are loaded to dump cars and hauled to their respective kilns.

The fourth bin, receiving selected stone from the quarry, is in the top of the main plant structure directly over an elevated crusher which takes stone from the bin and reduces it to 10 to 15-cm. size. This material is burned for "cement-lime"; it falls from the crusher to a second large storage bin, from which it is removed by two table feeders and elevated to the charging levels of two Manstaedt shaft kilns, each 10 meters high and 2.5 meters in diameter, and each having a capacity of 70 metric tons of burned lime daily. Lime is drawn automatically and fed through a system of four rollers for a preliminary reduction; it is then elevated to the upper level again and fed to two parallel slaking screws where water is sprayed on it to slake it. The slaked lime is stored in eight silos with a total capacity of 3,500 tons. Under these is a system of screw conveyors that reclaim from the bins and feed an elevator that lifts the lime to an air separator in connection with a dust-collecting apparatus. Rejects from the separator drop to a tube mill which grinds to a fineness of 7 to 8 per cent retained on a sieve having 4,900 meshes per sq. cm. This is returned to the air separator, the fine product of which is delivered by screw conveyors to a large silo in the bagging plant.

The kilns are fired with coke, and all machines are operated by individual electric drives. The lime deposits have been known at Ludwigsdorf since the year 1280, and since 1752 have been owned by the Demisch family. The property is now owned and operated by the Niederschlesische Kalkwerke Otto Demisch G.m.b.H.—Dr. Ing. Heinrich Luftschitz, *Tonindustrie-Zeitung* 54:1266-1268, Oct. 2, 1930.

Lime Operators Confined 1930 Efforts to Increasing Plant Efficiency

DURING the past year the lime industry did little in the way of building new plants or enlarging old ones, concentrating its efforts mainly on plant improvements. These improvements were in the crushing departments of the plants and in the methods of power application. The old line-shaft drives, operating all machinery from single motors, are rapidly being replaced by individual synchronous-motor drives. These are not only more economical because of their better power factor but they allow more flexibility of operation.

The use of natural gas as a kiln fuel increased considerably during the past year. This was particularly true in the Ohio and Shelby County, Ala., lime districts which receive gas through pipe lines from the Texas oil fields. The sudden popularity of this form of fuel was due not only to the pipe lines which had just been completed and which lowered the cost of gas considerably, but also to the improved and consistent quality of this gas.

One of the major plant developments of the year was the installation by Gypsum, Lime & Alabastine, Ltd., Canada, of a McGann Sobek kiln at its Milton, Ont., plant. This kiln, the first of this type to be installed on this continent, has been in full operation since late in the summer. Up to the end of the season this kiln produced an average of from 90 to 100 tons per day with a fuel ratio of 6½ to 1. During the year, the U. S. Gypsum Co. purchased and improved the plant of the Farnam-Cheshire Lime Co.; the American Lime & Stone Co. installed air separators and additional crushing equipment at its plant at Bellefonte, Pa.; the Whiterock Quarries Co. improved its plant at the same location; and the U. S. Lime Products Co. improved its plants at Sloan, Nev., and Sonora, Cal.

The year 1931 promises to be a prosperous one for the lime industry in general and some outstanding developments are expected. That this belief is held by many lime plant operators is evidenced by the large number of plant improvements to be made and the number of new plants planned. An increased demand is anticipated from each of the three principal markets for lime. There should be an increased demand for chemical lime for metallurgical use, water-softening and oil refining; and the expected increase in construction work will improve the market for building lime which had a poor year. The consumption of agricultural lime is also expected to show an increase.

The tendency in the industry will be to lower production costs by increasing fuel ratios and reducing fuel costs. A lowering in labor costs is also expected through the increasing tendency toward mechanical handling of materials, especially the handling of lime from kilns. The use of natural gas as fuel gives every indication of continued popularity and the adoption of the mixed-feed type of kiln is expected to become more general. The use of direct-connected electric power will increase and a number of improvements in burning and hydration are expected.

If current rumors are substantiated, the number of new plants built during the year will be greater than in any recent year. These prospective plants are not confined to any one section of the country, but are fairly well distributed over the continent. One of the few plants definitely planned is that of the Inland Lime & Stone Co. at Manistique, Mich., which will be built near the crushed-stone plant recently completed by this company. Indiana, Illinois, California, Ohio and British Columbia are expected to have one new plant each. Two are in prospect in the Mississippi Valley while several are expected to be built in Florida. It is also rumored that several plants will be built in Canada. No new plants are planned for the Woodville-Gibsonburg district, as this is already overbuilt, but a number of the existing plants will be improved.

The only new plant put into operation during the year was that of the Chester Valley Lime & Products Co. at Paoli, Pa., which went into operation late in the fall.

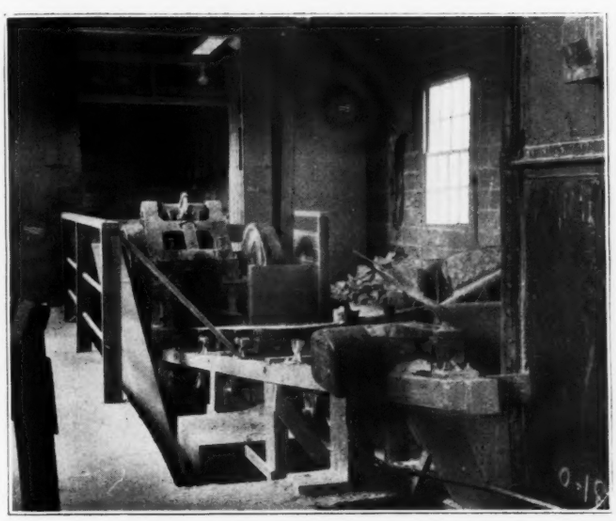
Four York 11-ft. by 60-ft. vertical self-supporting coal fired kilns are used. Lump lime is drawn by a pan conveyor to an elevator feeding to bin storage. The lump lime goes to a vibrating screen, the fines discharging to a Pennsylvania roll crusher. This discharges, by a series of elevators and conveyors, to a bin that feeds the Schulthess continuous hydrator which has a capacity of 5 tons per hour. Final separation is by a Sturtevant air separator and packing is done by a Bates packer.

Looking down the line of kilns at the Chester Valley lime plant.

Stabilization of Prices an Aid to Feldspar Producers; Standards Adopted

THE past year in the feldspar industry was comparatively quiet with few developments of unusual interest. Few major plant improvements were made outside those necessary to keep existing plants in operation. The condition of the industry was somewhat improved during the year by several price increases which allowed the operators a better margin of profit than in any recent year. Several consolidations made in 1929 were largely responsible for this stabilization.

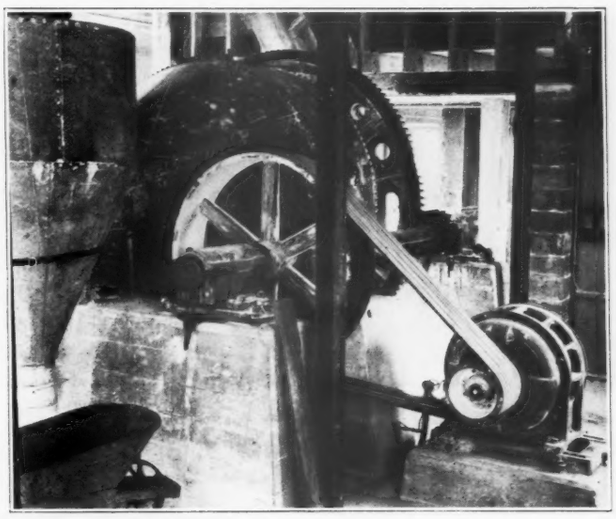
A general conference of producers, distributors and users of feldspar in the Bureau of Standards, Washington, D. C., early in the year, resulted in the formulation of a commercial standard classification submitted by the Feldspar Grinders' Institute. At a later meeting it was decided to submit these standards to the industry for approval, and they were adopted by the industry and went into effect on Sept. 1, 1930. In the May 7, 1930, issue of PIT AND QUARRY these standards were published in full.



The jaw crusher which reduces the material to ½-in. or less.

One of the outstanding developments of the year was the new plant of the Canadian Flint & Spar Co. at Buckingham, Que., Can. This plant has a capacity of from 1½ to 4 tons per hr. of finished spar and was built to satisfy the Canadian demand for this product. The mines from which the spar is secured are among the best on the continent and have for years furnished a large proportion of the raw spar imported into this country.

Spar is hauled to the plant in trucks and stored in a large wood-frame storage building. A Reliance 10-in. by 18-in. jaw crusher reduces the spar to under ½-in. size and discharges it to a short belt conveyor with a Dings magnetic pulley at its head. An elevator takes the spar to a timber storage bin from which it is fed to a Hardinge 8-ft. conical mill.

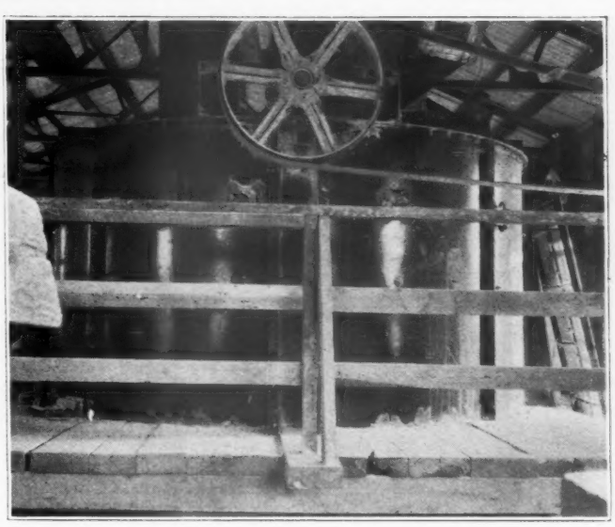


View of the conical mill showing multiple V-belt drive.

This, in turn, discharges to an elevator to the top of the building where the material discharges through a split chute.

The pulverized spar can be fed to a Sturtevant 10-ft. air separator. The coarse is returned to the mill and the fines are bagged for pottery spar. The other chute feeds a Hum-mer vibrating screen. The coarse from this screen also goes back to the mill, while the fines are bagged for glass spar. A dust collector is connected to the chutes and to both ends of the mill and produces 325-mesh material which is bagged for special use.

The main building is of concrete and concrete-block construction and was designed to give ample space for future enlargement. Equipment for the production of colored stucco for building purposes has recently been installed in this building.



Upper portion of the air-separator which handles pottery spar.

Shovel loading stone to one of cars in quarry.

Carload of stone being dumped into primary-crusher hopper.

Cement Plant Installs Electric-Haulage System to Speed Up Production

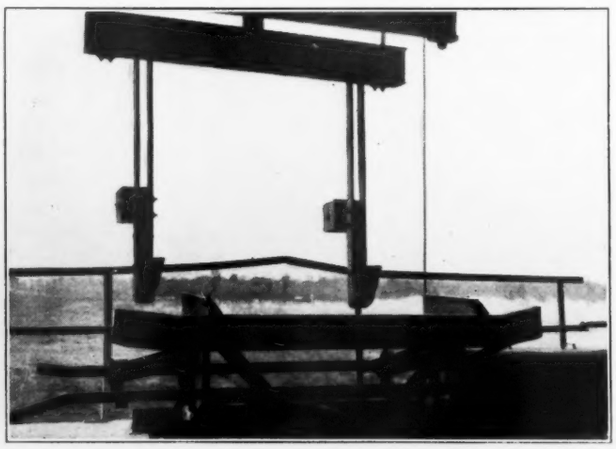
THE Arkansas Portland Cement Co. recently completed the installation of a Woodford electric-haulage system in its new plant at Okay, Ark. When this plant was completely described in the July 2, 1930, issue of PIT AND QUARRY, this haulage installation was only contemplated and a 60-ton steam locomotive and four 10-cu. yd. side-dump cars were in use.

With the old system the average production in a ten-hour day was only 800 tons. As the plant requires about 1,000 tons of raw material per day to operate at anywhere near capacity it was necessary to do a large amount of overtime work in the quarry and crushing plant. With the present system, using three 10-cu. yd. cars, as high as 2,100 tons of raw material have been placed in storage in ten hours. This record is the more remarkable because, as the quarry has been deepened, the grades have necessarily been made steeper and the curves sharper. It is now planned to operate the quarry only five 10-hour days per week because of this increased capacity. The entire quarry and crusher personnel consists of only six men which is a remarkably low number considering the tonnage handled.

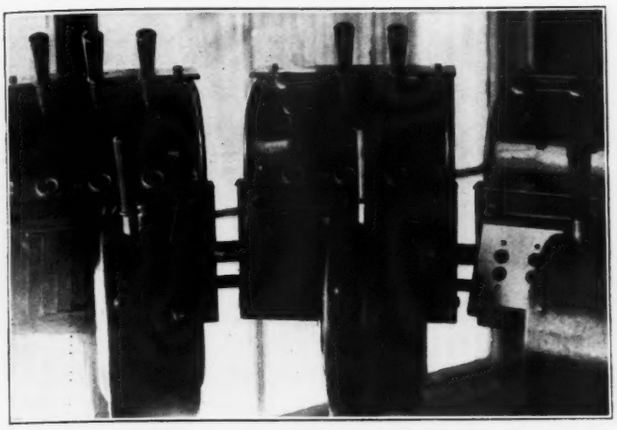
The quarry face is about 30 ft. high by 3,500 ft. long. Two thousand feet of this face nearest the plant is limestone while the remainder is shale. The near end of the quarry is about 1,000 ft. from the plant. A Marion Type 480, 2½-cu. yd. electric shovel is used for loading stone and a Bucyrus-Erie ¾-cu. yd. gasoline-air shovel for shale.

The cars were furnished by the Woodford Engineering Co. but were built by the Western Wheeled Scraper Co. They are of composite wood and steel construction and are of the one-way side-dump type. Each car has two Allis-Chalmers 35-hp. motors of the same type as those used on standard street railway cars. Each motor drives an axle through direct single-reduction gearing. These cars have a water-level capacity of 10 cu. yd. but they actually haul about 16-cu. yd. of material up the 6½-per cent grade to the plant. Each car is equivalent in

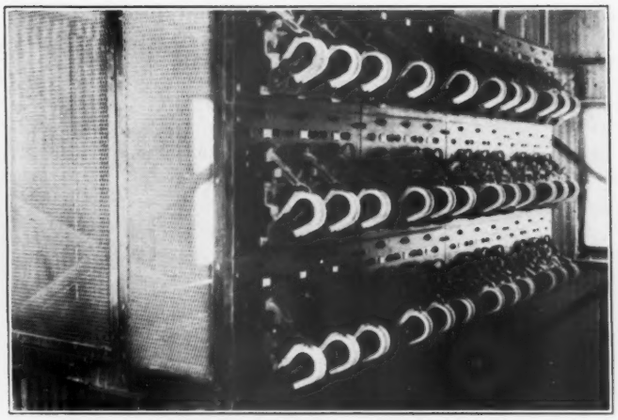
Carload of material on the way to the plant. Note simplicity of track and third rail arrangement.



The car dumping mechanism and the reversing rack which also holds car under frames while dumping.



Three of the five controllers with which one operator controls all car movements.



The contactor panels in the control building which carry the heavy current.

power to a 35-ton locomotive as, on occasion, is used to haul a standard box car loaded with gypsum up a 2½-per cent grade to the plant for unloading.

The control tower from which the entire system is controlled is built into the crusher building. One operator controls all car movements from this tower through five controllers grouped conveniently before him. The contactor panels which carry the heavy current are also in this tower. Each controller provides for three running speeds, one off position for coasting, and three brake positions for various brake pressures. With the handle in the off position a car will coast indefinitely as the brakes do not set until the brake current is turned on.

In its regular cycle of operation, this system is semi-automatic, the controls being set so that the operator need not attend to the cars except for a few feet at the loading and discharge ends where they require accurate spotting. The loaded cars are dumped at either the shale or stone hoppers by two Woodford standard electric car dumpers. On each of these car dumpers an equalizer carrying two hooks automatically swings forward engaging the car body. These hooks automatically right the car body when they free themselves from the car. A single dump controller with five speeds up or down controls either car dumper and permits accurate control of dumping speed. Each car dumper operates between limit switches which automatically stop the dumping unit at the top and bottom of its travel. No car attendant is necessary here, all operations being controlled from the tower by the tower operator.

Opposite each dumping unit is a reversing stand which serves also to hold down the car under-frame while the load is being dumped. This stand is so designed that it enables the tower operator to throw the reversing switch on a car when it is spotted at the hopper. By this method all that is necessary after the car is dumped, to start it back to the quarry, is to turn on the current. Should a car be allowed to run past its discharge point this also permits the operator to run it back into place without loss of time.

This system of haulage does not require a complicated system of rails for its operation. In addition to the customary two running rails all that is necessary is a single light third rail which carries both the running and the braking current to the cars. As low-voltage direct current is used, this rail need not be parallel with a copper feeder in any form. The motors used in the cars also provide dynamic braking action on a down grade, and their characteristics are such as to combine economical power consumption with variable-speed operation. The three-speed control gives the cars a range in speed on a level track of from 12 to 20 miles per hr.

The entire haulage system was furnished and installed by the Woodford Engineering Co. This company specializes in this type of haulage system and has made installations since 1904 in some of the foremost plants in the pit and quarry industries.

Colored Concrete Sidewalks Proving Popular in New Orleans

While the ordinary concrete sidewalk, inconspicuously neutral in its color remains, and probably will continue to be the standard, much attention is being focused on the efforts of certain cities to "dress up" their walks.

New Orleans has attracted a great deal of notice recently because the walks of two of its most famous streets, Canal and Baronne Streets, have been rebuilt in colored concrete. Canal Street, the scene of the Mardi Gras parades, has blossomed out in terrazo walks in two colors. The borders of the walk are a rosy red, achieved through the use of mineral pigments, while in the center the concrete is forest-green, marked off in diamond-shaped divisions.

Colored concrete and terrazo walks are to be found in many parts of the country, particularly in tourist centers where people have time to promenade at leisure. Decorative effects obtainable through the use of colored concrete are endless in their variety and there is practically no limit to the variation possible. Scientific research has developed the technique of using color with concrete and has determined the proper pigments to use in producing any desired color.

The possibilities in color in concrete open up new fields for the cement contractor and dealer. There never was a time when the demand for color was as insistent as it is today.

Bituminous Paving May Open Up Greater Market for Small Gravel Sizes

Hoosier Operators Hear Topic Discussed in Convention Sessions at Indianapolis

BLACK-TOP paving for secondary-road systems, utilizing sand-and-gravel products, was the theme of the principal speakers at the annual convention of the Indiana Sand & Gravel Assn. The convention, which was the association's sixteenth, was held at the Claypool Hotel, Indianapolis, Ind., Friday, Dec. 16, 1930.

S. C. Haddon, executive secretary, in introducing the subject, refuted the old belief that uncrushed gravel could not be bound by bituminous materials into a satisfactory pavement. It was formerly thought that only the larger sizes of crushed stone could be used for this purpose successfully. Recent experiments by highway engineers and bituminous-paving-material manufacturers, he pointed out, have shown that a properly-designed pavement of this type does not require the larger sizes of gravel, in fact, the smaller size pea gravel proves an ideal material for this purpose. Even sand has been used successfully as a top-surface material, Mr. Haddon informed his audience.

The results of these experiments have raised a new hope among many producers who have long sought a market for pea gravel and unsalable excess sand. While some producers market this material in the form of cement blocks, tile, pipe and kindred products, the market is accepted as limited and seasonable. Secondary-road systems and the majority of rural roads are, however, an almost unlimited market. To consider this new outlet for sand and pea gravel and to discuss its possibilities, was the thought in preparing the convention's program, according to Mr. Haddon.

Irwin C. McDonald, asphalt department, Standard Oil Co., Indianapolis Division, was the first speaker on the program. Early in his talk, he denied that the bituminous men had a business tie-up with the crushed-stone industry, explaining that, while the past policy in using crushed stone may have indicated such collusion, at present the bituminous-material producers are glad to use gravel. He stated that they are more than willing to coöperate with responsible contractors who know their business and who are capable of doing good work. In discussing the quality of surface produced by bituminous-bound gravel pavement, Mr. McDonald stated that experiments have proved that gravel-topped surfaces will not break down under wear as quickly as do surfaces that are finished with crushed stone. He was clear in his statement that concrete paving has a definite place in our road-construction programs, although he admitted that bituminous pavement has its place principally in the development of our secondary-road systems where a cheaper yet durable surfacing is needed. In closing his talk, he stated that the possibilities of development lie with the lower grades of oil rather than with retread oils and penetrating oils now commonly used by many county-highway departments.

Thomas W. Kelly, representing the Durable Roads Co., also of Indianapolis, Ind., was introduced as the second speaker. He is well known among aggregate and road-construction circles, having been a student of road materials for many years, even to the extent of having a laboratory at his home. In opening his discussion, Mr. Kelly pointed to the practices of the early mining days when only the lode ores were used, all the by-products being wasted. Today, mining methods utilize and market every possible by-product and often reclaim old waste piles, recovering, through new processes, minerals of greater value than the original ore. Looking to the meat-packing industry, Mr. Kelly stated, in substance, that this highly developed industry recovers and markets its own by-products, realizing on their sale, instead of transferring its waste materials to other industries for manufacture and disposal, as in former times. Why, then, should not a producer sell his pea gravel and sand by-products in the forms of finished paving materials? Mr. Kelly asked. He continued, in some detail, his suggested method of producing these materials.

Briefly, his plan contemplates the establishment of an asphalt-treating-and-mixing plant at the plant of the producer. With proper equipment the material would be mixed and treated hot in two forms. One form, which could be stocked in piles indefinitely without compaction, could be shipped at any time for any distance. This type of mixture, upon arrival on the job, would be treated with additional bituminous binder in the usual type of concrete mixer, spread and rolled into compaction. The other form of mixture would be a finished road material prepared hot at the plant and shipped immediately to the job ready for spreading and rolling, even if cooled in transit. The advantages in having the treating and mixing equipment at the plant of the producer are the centralization of the work and the avoidance of cost in the moving of the equipment, which, frequently, is great enough to prevent a contractor from bidding on small jobs located at distances.

In commenting on the quality and type of materials, Mr. Kelly stated that the bituminous binder used must not be brittle in freezing weather, and that the mixture must allow further working action after the road is opened to traffic and until it reaches its maximum compaction. At this stage there

should be but a light film of seal appearing at the surface. The mixture produced should have not less than 1,500-lb. stability when tested at 140 deg. F. on a standard testing machine as specified by the Asphalt Assn. When subjected to an immersion test, the mixture should not absorb more than 2 per cent water in 48 hours.

Mr. Kelly discussed the factor of stability at some length. Quoting the writings of Provost Hubbard, chemical engineer, he stated that "stability is the power of resistance to deformation or internal displacement under such stresses as are imposed through the action of traffic." "Unless there are incorporated in the mixture," he continued, "the qualities that bring about stability, the life of blacktop pavements is going to be on the toboggan slide." Some types of mixtures, employing a thin bituminous coating film along with a poor grading of material, will tend to retard instead of advance the use of this type of pavement. Concluding his talk, Mr. Kelly pointed out the value of orderly grading of the road materials, stating that, with the proper amount of bituminous binder, orderly grading will assure the maximum points of contact and will produce a mixture free from harshness and segregation. In addition, it will bring about a finished mass that can be easily worked on the job and driven into compaction that will produce a wearing surface of excellent quality.

The third speaker on the program was Jack Hays of the Pre-Cote Corp. of Indianapolis. He described the Pre-Cote process and answered the questions put to him by members of the audience concerning it. In substance, he stated, the Pre-Cote process involves the immersion of the aggregates in the bituminous binder before their application to the roadbed.

After a recess for luncheon attended by both members and guests of the convention, the program was continued. Both Messrs. McDonald and Kelly were called upon to answer questions on their papers.

Following this discussion, C. G. Alfs, of the Barrett Co., was introduced as the fourth speaker on the program. He reviewed the early methods of building bituminous pavements. "In 1919," he said, "5 in. of crushed limestone followed by a 3-in. layer of crushed limestone with a few gallons of tar poured over it was considered a good job." He outlined the promotion program of the Barrett Co., and showed proof-sheets of many full-page advertisements published in nationally-known magazines. Some of the significant facts pointed out in these advertisements are that, in 25 years of road construction, but 17 per cent of our roads have been improved, and that, with 15,000 new cars placed on the highways every day in the year, quantity production is necessary in highway construction. The Barrett Co. advocates the bituminous type for many of our primary and secondary road systems because it is cheaper and more roads can be built for the money. The more the roads cost, the longer will it take to get them.

The convention opened its morning session with a silent tribute to the two departed members of the association, Herman E. Neal of the Neal Gravel Co., Mattoon, Ill., and John R. Connelly of the Terre Haute Gravel Co., Terre Haute, Ind. Wm. H. Sanders, of the Western Indiana Sand & Gravel Co., president of the association, presided at the meeting and, after the tribute, appointed a nominating committee for the selection of officers for the coming year. The program of speakers, as already related, took up the balance of the morning's session. A proposition to revise the Indiana lien law was presented by W. M. Holland, secretary of the Indiana Highway Constructors' Assn. He pointed out that the Ohio Bar Assn., after a study of the lien law, recommended its elimination. In its stead, he recommended the establishment of credit bureaus by the producers for their protection, claiming that this method would result in the proper rating of contractors which would automatically classify them according to their abilities to handle large or small jobs. He suggested billing the contractors on the basis of 30 days, net, and then sending sight drafts. If the method failed, due process of law would become a final recourse. In concluding, Mr. Holland said that the proposed change in the lien law would make for stability in the industry, and he earnestly urged the members of the association to coöperate with the contractors in putting it through the legislature. A discussion was held on his proposal later during the meeting and resulted in a unanimous sentiment against any change in the existing law. A communication to that effect was then ordered directed to Mr. Holland.

The afternoon business session was opened by Mr. Sanders' own report on the efforts to induce the Indiana highway officials to change their method of purchasing aggregates from the yardage basis to the tonnage basis. He told of the difficulties encountered and stated that the matter had been turned over by the highway officials to the engineering department of Purdue University for its opinion. It was hoped that the Purdue engineers would settle the matter definitely.

Wm. Sanders.

Mr. Haddon then gave his annual report to the association. In it he reminded the members to watch the proceedings of the legislature in its January session, especially as to any activities on the gas tax which might result in the shifting of the burden of the tax from the real-estate owners to the automobile owners, thereby affecting the road-construction expenditures.

Following the reading of the financial report, the committee expressed satisfaction with the condition of the association, and unanimously recommended the retention of Mr. Haddon as executive secretary. The nominating committee then submitted the names of the men to fill the association's offices dur-

ing the coming year. The following were elected: Wm. Sanders, president; Floyd Million, vice-president; Chas. F. Connelly, secretary-treasurer; Ben Stone, director; and E. C. Theobald, director.

Mr. Sanders closed the official proceedings of the meeting by presenting his own comment on the black-top pavement discussion, and expressed the hope that, in a future meeting, more data as to the types and specifications of pavements and their costs would be presented. An informal discussion followed, each member being called upon to say a few words.

Several prominent men, associate members of the association, were present to renew their friendships.

Registration

Court Alfs, Barrett Co., New York, N. Y.
Earl Baker, Baker Gravel Co., Noblesville, Ind.
E. C. Bauer, Kensington Steel Co., Chicago, Ill.
M. F. Beisber, PIT & QUARRY, Chicago, Ill.
W. H. K. Bennett, W. H. K. Bennett Co., Chicago, Ill.
William Berninger, A. Leschen & Sons Co., St. Louis, Mo.
Frank Billeter, Indiana Gravel Co., Inc., Indianapolis, Ind.
Donald Binford, Delaware Sand & Gravel Co., Muncie, Ind.
Jerome Chamberlain, Kickapoo Sand & Gravel Co., Peru, Ind.
Charles F. Connelly, Terre Haute Gravel Co., Terre Haute, Ind.
James P. Coyle, Consumers Co., Chicago, Ill.
H. A. Gray, Western Indiana Gravel Co., Lafayette, Ind.
Abe Hart, Sanborn, Ind.
Don Hart, Sanborn, Ind.
L. Hart, Wabash Sand & Gravel Co., Terre Haute, Ind.
Jack Hays, Pre-Cote Co., Indianapolis, Ind.,
Herbert Hoffman, Geo. J. Hoffman Co., South Bend, Ind.
W. M. Holland, Indiana Highway Constructors' Assn., Indianapolis, Ind.
H. C. Huffstetter, Brown-Huffstetter Material Co., Indianapolis, Ind.
Thomas W. Kelly, The Durable Roads Co., Indianapolis, Ind
Arthur Lacey, Indiana Gravel Co., Inc., Indianapolis, Ind.
W. B. Lenhart, *Rock Products*, Chicago, Ill.
W. T. MacDonald, Manufacturers' agent, Indianapolis, Ind.
Bruce Maxwell, Maxwell Gravel Co., Indianapolis, Ind.
Howard Maxwell, Maxwell Gravel Co., Indianapolis, Ind.
W. R. McDonald, Western Indiana Gravel Co., Lafayette, Ind.
Irwin C. McDonald, Standard Oil Co., Indianapolis, Ind.
J. E. McNally, Raybestos Manhattan, Inc., Chicago, Ill.
Floyd Million, Million Sand & Gravel Co., Lake Cicott, Ind.
Frank Million, Million Sand & Gravel Co., Lake Cicott, Ind.
K. R. Misner, Western Indiana Sand & Gravel Co., Lafayette, Ind.
Percy Nagle, American Manganese Steel Corp., Chicago Heights, Ill.
Wayne Nattkemper, Terre Haute Gravel Co., Terre Haute Ind.
Ben Neal, Neal Gravel Co., Mattoon, Ill.
M. A. Neville, Western Indiana Gravel Co., Lafayette, Ind.
Clyde Piper, Connersville Gravel Co., Connersville, Ind.
Chas. H. Purdrum, Sturm & Dillard Co., Columbus, O.
W. H. Sanders, Western Indiana Sand & Gravel Co., Lafayette, Ind.
Dayton Snyder, Sanborn, Ind.
Ben Stone, Morom Gravel Co., Indianapolis, Ind.
E. Guy Sutton, Neal Gravel Co., Mattoon, Ill.
Edward Theobald, Anderson Theobald Co., Vincennes, Ind.
Arthur Wilson, Indiana Gravel Co., Inc., Indianapolis, Ind.
Lee R. Witty, Wabash Sand & Gravel Co., Terre Haute, Ind.
Clark Young, Cincinnati Rubber Co., Indianapolis, Ind.

Sand and Gravel Plants Reviewed

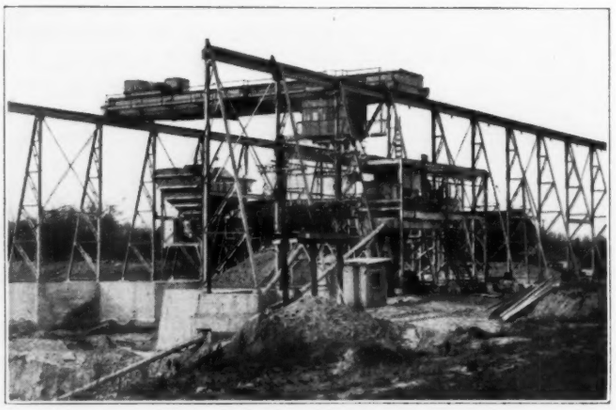
(Continued from Page 94)

The processing of the gravel is accomplished in the conventional way, employing a Universal vibrating screen which serves as a scalper. Oversize gravel, which forms but a small percentage of the total volume of gravel, is stored in a bin mounted above the crusher. When required, the oversize material is crushed, discharging directly to the final classifying screen above the carloading bin.

Two men can operate this plant at night time, under full production. Because of the provision made for stock-piling the gravel beneath the scalping screen, only one man is required to handle the plant equipment. This man, stationed at the sand pump, tends to the disposal of sand accumulated in the sump. The gravel is automatically handled by the scalping screen, going either to the oversize bin or to the stock-pile beneath. A second man is stationed on the dredge to control the dredge-pump suction pipe. The balance of the plant operation, including crushing of oversize gravel, classifying of material and carloading, is left to the day crew, which consists of twelve men.

Dolomite Products Co., Inc.

The Dolomite Products Co., Inc., of Rochester, N. Y., early in the summer put into operation a new plant which is extremely radical in design. This plant offered a rather difficult problem, however, as



View of the new Dolomite Products Co. plant showing its unique method of handling sized material.

the deposit was a high bank of sand and gravel and the only outlet to Rochester was a highway on a level with the top of the deposit. Location of the plant at the bottom of the deposit would have necessitated trucking all shipments up a long, steep hill from the plant.

The system decided upon was to excavate by dredging and have a booster pump part of the way up the hill to the plant at the top. The dredge line discharges here to a box from which the material discharges to a triple-deck vibrating screen. This produces two sizes of gravel and sand. The sand goes to two sand-settling cones for the production of two sizes of sand. All sizes of material discharge to ground level storage bins from which they are rehandled to loading bins or open stock-piles by an overhead traveling crane.

N. Y. Gravel Men Discuss Plan to Merge with Crushed Stone Association

MEMBERS of the Empire State Sand and Gravel Association gathered for their annual winter meeting at the Sagamore Hotel, Rochester, N. Y., on Dec. 16, 1930. The meeting was unusually well attended by prominent New York state producers, among them H. V. Owens, president of the Eastern Rock Products Co., Utica, N. Y. and vice-president of the National Sand and Gravel Association.

After a luncheon served in the sun parlor of the Sagamore Hotel, the meeting was officially opened by President C. W. Maxwell, who introduced J. Franklin Bonner, secretary of the Board of Regional Planning, Monroe County, New York, who was the principal speaker. He discussed the various phases of regional planning, particularly as to highway construction which, of course, was of especial interest to the members of the association. He told of the traffic problems of his county and the many phases of the problem of relieving traffic congestion. The construction of new highways and the improvement of existing thoroughfares, when planned through such studies, are bound to result in a more efficient system of handling the ever-increasing traffic of our counties.

Great interest was shown by the members in the aerial survey maps of Monroe County and the many charts prepared by the Board for the purpose of showing the exodus of population from smaller communities to the larger centers of industrial activity and the increased automobile registration.

Following his talk various members discussed current problems. Henry F. Marsh presented the proposition of consolidating the association with the New York State Crushed Stone Association. He stated that a committee of three members of the stone association was willing to confer with a like committee of the sand-and-gravel body to discuss the proposition.

Along with the general discussion of the topic, H. V. Owens expressed himself as being in favor of the idea, stating that the problems of the two bodies were quite similar and that the consolidation of the two groups would result in greater strength to meet these problems. Mr. Owens appealed to the members for greater coöperation with the National Sand and Gravel Association, and suggested that some means be taken by the association to assist the national body in its work. The enrollment of the entire state association as a body in the national organization was suggested through an increase of dues. However, action on the matter was deferred to the March meeting. A committee was then appointed by President Maxwell to take up the matter of consolidation with the crushed-stone association. Those appointed were Henry Marsh, H. V. Owens, and Henry Stelley.

Nomination of officers then took place, and the following men were elected for the coming year: C. W. Maxwell, president; H. N. Snyder, vice-president; and R. M. Kelly, secretary-treasurer. Members of the executive committee, who also become officers of the associations, were then appointed by Mr. Maxwell. They are H. A. Stelley and Henry F. Marsh.

Representatives of various manufacturers displayed models and samples of their equipments. Frank Welch displayed a model of the new Allswede gravel scrubber. N. S. Snyder of the Link-Belt Co. showed several conveyor idlers. He also displayed a microscope showing the possibilities of the use of this instrument in the determination of the quality of sand samples. Among the other representatives were: J. R. Norton, Smith Engineering Works; Jas. B. Cousart of the Victor Balata Belting Co.; J. Shuman Hower; V. J. Milkowski of the Morris Machine Works; and A. E. Fielding of the Niagara Concrete Mixer Co.

Registration

C. A. Adams, Rotterdam Jct., N. Y.
M. F. Beisber, PIT AND QUARRY, Chicago, Ill.
J. F. Bonner, Monroe County Regional Planning Bd., Rochester, N. Y.
E. L. Carpenter, Buffalo Slag Co., Buffalo, N. Y.
J. C. Carpenter, Madison Sand & Gravel Corp., Rochester, N. Y.
John G. Carpenter, Madison Sand & Gravel Corp., Rochester, N. Y.
Jas. B. Cousart, Victor Balata Belting Co., Easton, Pa.
Robert Duolf, Pittsburg Testing Laboratories, Buffalo, N. Y.
R. W. Eberly, Buffalo Gravel Corp., Buffalo, N. Y.
A. E. Fielding, Niagara Concrete Mixer Co., Buffalo, N. Y.
John Franz, Buffalo Slag Co., Attica, N. Y.
O. F. Freeman, Edwards, N. Y.
L. B. Gray, Eastern Rock Products, Inc., Utica, N. Y.
J. Shuman Hower, Utica, N. Y.
Chas. O. Hutchins, Wyoming Sand & Stone Co., Wilkes Barre, Pa.
O. Hyman, Buffalo Gravel Corp., Buffalo, N. Y.
E. J. Karlen, Rome Cast Stone Co., Rome, N. Y.
R. M. Kelly, Eastern Rock Products, Inc., Utica, N. Y.
B. F. Maier, Clarence Sand & Gravel Co., Buffalo, N. Y.
Henry F. Marsh, Consolidated Materials Corp., Rochester, N. Y.
C. W. Maxwell, Albany Gravel Co., Albany, N. Y.
V. J. Milkowski, Morris Machine Works, Baldwinsville, N. Y
J. R. Norton, Smith Engineering Wks., New York, N. Y.
E. J. Nunan, Buffalo Slag Co., Buffalo, N. Y.
Carlton V. Oaks, Oaks Corners, N. Y.
Nathan Oaks, Nathan Oaks & Son, Oaks Corners, N. Y.
H. V. Owens, Eastern Rock Products, Inc., Utica, N. Y.
H. E. Rainer, Buffalo Slag Co., Buffalo, N. Y.
F. A. Rider, F. A. Rider, Inc., Endicott, N. Y.
J. Robinson, Eldredge & Robinson, Auburn, N. Y.
M. P. Ryley, Clarence Sand & Gravel Co., Buffalo, N. Y.
W. E. Smith, Buffalo Slag Co., Buffalo, N. Y.
H. N. Snyder, Buffalo Slag Co., Buffalo, N. Y.
N. S. Snyder, Link-Belt Co., Buffalo, N. Y.
H. A. Stelley, Buffalo Gravel Corp., Buffalo, N. Y.
R. R. Strickler, Link-Belt Co., Buffalo, N. Y.
H. W. Vickery, Buffalo Slag Co., Franklinville, N. Y.
J. H. Wagoner, Eastern Rock Products, Inc., Utica, N. Y.
F. M. Welch, F. M. Welch Eng. Service, Greenville, O.
M. E. Woodcock, Edwards, N. Y.

Cement Production Near Normal During Year Despite Building Decline

Nationwide Highway Construction Programs Aid Mills; Increased Demand in 1931 Seen

STIMULATED by extensive road-building programs, the production of Portland cement in the United States in the first eleven months of the current year was only slightly lower than the output in the corresponding portion of 1929. This performance was recorded, notwithstanding a decline of about one-fifth in the total building and engineering construction work. Because of the cement requirements of the paving industry, this commodity is in a comparatively strong statistical position, as contrasted with other building materials. With the certainty that road-building will be continued during the ensuing year and the further likelihood that building and construction projects will get under way during that period, an increased demand for cement is indicated.

The table at the bottom of the page was compiled by the Bureau of Mines, U. S. Department of Commerce, exclusively for PIT AND QUARRY and shows both production and shipments during the current year, by months, for each producing district. As usual, the Lehigh Valley district was the heaviest producer in the country.

Although demand and production in the current year approach an equilibrium and consumption of cement has kept up to the levels of a year ago, it is not likely that earnings of the manufacturers will be maintained at the levels of last year, due to the somewhat lower price prevailing. The reflection of less satisfactory performance has already been found in such revenue reports as have been published covering recent operating periods. During the first seven months of 1929 cement sold at about $1.65 a barrel, which contrasts with prices of about $1.60 a barrel during a like period in 1930.

While production in the first quarter of the current year was in excess of shipments, production and shipments practically balanced in the following quarter and in July and August shipments exceeded production. At the close of August the stocks on hand were slightly less than at the close of the 1929 year. Production continued to run behind shipments in September and October but in November, the reverse was true. At the end of the current year, stocks on hand are estimated to be barely sufficient to supply the normal demand, indicating a healthy condition in the industry so far as the tendency to overproduce is concerned.

In anticipation of improved business conditions in 1931 most plants are undergoing a thorough overhauling to put them in shape for efficient, economical operation during the coming twelve months.

Both the productive capacity of the industry and the consumption of cement have advanced fairly steadily and within two decades output has increased from less than 48,000,000 barrels in 1907, to a record of 176,298,846 barrels in 1928. The production receded to about 170,000,000 barrels in 1929, and estimates indicate a slight shrinkage to 161,000,000 barrels for the full 1930 year on the basis of the 4.1 per cent reduction in output in the first nine months of the current year.

SUMMARY OF MONTHLY ESTIMATES OF PRODUCTION AND SHIPMENTS OF FINISHED PORTLAND CEMENT IN 1930, BY DISTRICTS
(In thousands of barrels)

District	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
PRODUCTION											
Eastern Pa., N. J., and Md	2,286	2,033	2,715	3,067	3,707	3,397	3,566	3,676	3,273	2,793	2,973
New York and Maine	320	187	618	999	1,176	1,271	1,249	1,396	1,238	1,220	848
Ohio, Western Pa., and W. Va	727	762	1,205	1,458	2,112	1,924	1,973	2,009	1,873	1,655	1,537
Michigan	346	543	383	562	1,419	1,487	1,410	1,426	1,242	1,130	1,228
Wis., Ill., Ind., and Ky	1,377	883	1,129	1,366	2,143	2,336	2,255	2,409	2,171	1,938	1,760
Va., Tenn., Ala., Ga., Fla., and La	842	727	1,099	1,262	1,306	1,316	1,213	1,232	1,198	1,132	1 085
Eastern Mo., Ia., Minn., and S. Dak	758	748	971	1,415	1,763	1,987	1,832	1,933	1,748	1,591	1,344
Western Mo., Neb., Kan., Okla., and Ark	701	709	945	1,160	1,360	1,322	1,405	1,361	1,233	957	1,176
Texas	321	482	694	757	630	558	585	697	679	484	661
Colorado, Montana, Utah, Wyo., and Idaho	0	130	240	286	314	300	217	302	260	134	120
California	718	755	873	838	926	955	1,009	922	806	953	1,091
Oregon and Washington	102	203	351	351	393	386	364	458	403	423	230
	8,498	8,162	11,225	13,521	17,249	17,239	17,078	17,821	16,124	14,410	14,053
SHIPMENTS											
Eastern Pa., N. J., and Md	1,388	1,419	2,311	3,127	3,746	3,903	4,085	4,161	3,813	3,535	2,949
New York and Maine	249	257	472	839	1,191	1,381	1,524	1,560	1,467	1,201	738
Ohio, Western Pa., and W. Va	472	651	724	1,375	1,974	2,119	2,358	2,338	1,984	1,704	1,197
Michigan	234	297	411	702	1,229	1,459	1,604	1,627	1,381	1,093	667
Wis., Ill., Ind., and Ky	327	664	696	1,265	2,026	2,552	2,916	3,045	2,716	2,115	1,219
Va., Tenn., Ala., Ga., Fla., and La	730	881	970	1,239	1,192	1,180	1,327	1,328	1,178	1,248	1,025
Eastern Mo., Ia., Minn., and S. Dak	214	492	502	1,230	2,184	2,412	2,540	2,491	2,116	1,618	742
Western Mo., Neb., Kan., Okla., and Ark	271	764	838	1,264	1,390	1,404	1,442	1,412	1,227	947	788
Texas	317	521	627	776	620	706	709	634	599	469	523
Colorado, Montana, Utah, Wyo., and Idaho	42	104	163	262	290	296	276	292	258	227	119
California	640	793	816	921	980	951	946	961	905	1,006	1,038
Oregon and Washington	71	169	296	340	402	418	426	450	439	436	217
	4,955	7,012	8,826	13,340	17,224	18,781	20,153	20,299	18,083	15,599	11,222

A Study of Crawler Tractors as Applied to the Pit and Quarry Industry

By M. F. BEISBER

PART TWO

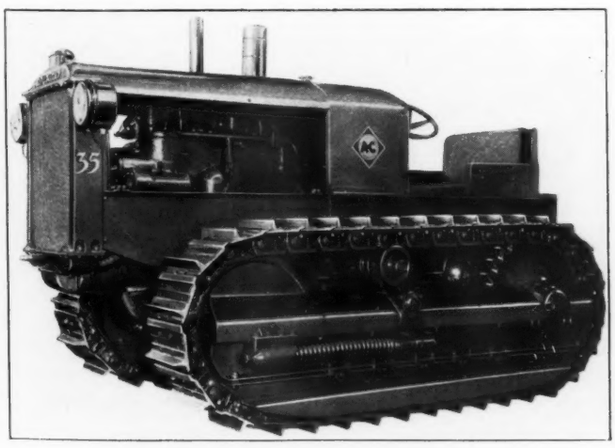
EACH of the following descriptions of crawler tractors follows closely the specification table for its make and points out its principal features of design and construction. For further detailed specifications, the reader may write to the manufacturers who will gladly send the desired information in the form of literature and photographs.

Allis-Chalmers

One product of the Allis-Chalmers Mfg. Co. is its tractor. The Springfield, Ill., plant is especially designed for tractor manufacture. The Allis-Chalmers crawler tractors are built in three sizes—the 35, the 50, and the 75—these sizes indicating their approximate maximum drawbar-horsepower.

Allis-Chalmers engines are specifically designed for tractor use. They are of the 4-cylinder type, with cylinders cast enbloc, similar to automotive-engine design. The Models 35 and 50 motor blocks have removable cylinder sleeves. Specifications of the motor include an Eisemann magneto, a Zenith carburetor, an Allis-Chalmers built-in governor, an air cleaner and a Purolator oil filter. Oil is supplied, under automatically controlled pressure, to the engine parts by a positive-gear pump. All models are designed for self-starters, permitting the motor to be stopped while waiting for loads or for equipment changes on the drawbar. Self-starting is not only a great convenience but it results in economical operation, according to the manufacturer's claims.

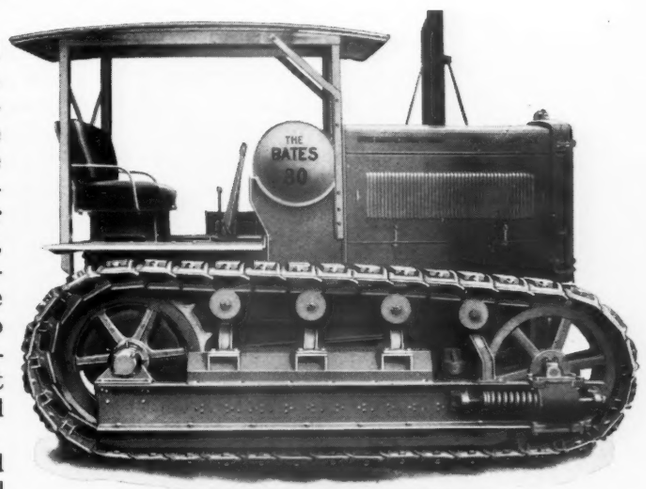
The transmission features the uses of carburized gears. Gear locks are provided to prevent partial slipping out of mesh or overlapping. The transmission case is designed with few openings and is heavily reinforced to withstand stresses. The flywheel clutch and the two steering clutches are contained in the transmission case. The former are of the dry-plate type, the latter, of the multiple-disk type which can be removed without dismantling the track-drive assembly or breaking the track.



Allis-Chalmers 35 tractor.

In the transmission of Model 75, provision has been made for speed changes in the power take-off. This feature is of particular advantage in handling elevating graders.

The track-and-roller construction on all models is designed so that the side angles of the track-rail correspond to the angle on the flange of the track-wheels for the purpose of properly taking all side-thrust loads.



Bates 80 with canopy top.

Both the 75 and 50 models employ roller-chain final drives, similar to those on heavy-duty trucks, and frames are used to carry the engine and transmission. The Model 35 is of the unit-type construction, employing a gear final-drive, with the transmission case bolted to the motor in such a manner that no frame is necessary.

All Allis-Chalmers tractors steer with wheels the same as with automobiles and trucks.

Bates Steel Mule

Bates Steel Mules are built by the Foote Bros. Gear & Machine Co., at the Bates plant, Joliet, Ill. Many of the forgings, parts and gears are built in the Foote Bros. plants in Chicago.

Three sizes of machines are built, the Thirty-Five, Forty-Five and Eighty, the sizes indicating the approximate drawbar horsepower. Unit construction is employed, with the transmission case rigidly bolted to the engine. This unit is mounted in a frame insuring alignment of the transmis-

SPECIFICATIONS OF CRAWLER TRACTORS

Name and Model Number of Tractor	Rating (*hp.*)	Weight (*lb.*)	Nebraska Test Data			Engine								
			Belt Power (*hp.*)	Drawbar Pull (*hp.*)	Drawbar Pull (*lb.*)	Make of Engine	Number of Cylinders and Bore and Stroke (*in.*)	Normal Speed (*r.p.m.*)	Make of Governor	Make of Magneto	Make of Carburetor	Kind of Fuel and Capacity of Tank (*gal.*)	Make of Air Cleaner	Make of Oil Filter
Allis-Chalmers, 35	30	10,680	.....	37.67	3,525	Own	4—4¾x6½	930	Own	Eise.	Zen.	Gas—33	Own	Purol.
Allis-Chalmers, 50	43-55	15,100	62.18	50.14	4,613	Own	4—5¼x6½	1,000	Own	Eise.	Zen.	Gas—35	Own	Purol.
Allis-Chalmers, 75	59.5	21,700	.....	65.97	7,550	Beav.-LeR.	4—6½x7	850	Le Roi	Amer.	Zen.	Gas—60	Own	Purol.
Bates, 35	35	11,600	(2)	(2)	(2)	Wauk.	4—4¾x6¼	975	Wauk.	Bosch	Scheb.	Gas—30	Pom.	(6)
Bates, 45	45	13,000	(2)	(2)	(2)	Wauk.	4—5 x6¼	1,000	Wauk.	Bosch	Scheb.	Gas—30	Pom.	(6)
Bates, 80	65	22,500	(2)	(2)	(2)	Wauk.	4—6½x7	900	Wauk.	Bosch	Scheb.	Gas—70	Pom.	.....
Caterpillar, Ten	10-15	4,575	18.10	13.58	1,455	Own	4—3⅜x4	1,500	Own	Eise.	Ens.	Gas—17½	Pom.	(6)
Caterpillar, Fifteen	15-20	5,931	24.77	19.46	2,039	Own	4—3¾x5	1,250	Own	Eise.	Ens.	Gas—23	Pom.	(6)
Caterpillar, Twenty	20-25	7,822	29.49	23.15	1,860	Own	4—4 x5½	1,100	Own	Eise.	Ens.	Gas—25	Pom.	(6)
Caterpillar, Thirty	25-30	9,065	37.83	32.02	3,343	Own	4—4¾x6½	850	Own	Eise.	Ens.	Gas—37	Pom.	(6)
Caterpillar, Sixty	50-60	20,000	72.51	60.22	6,240	Own	4—6½x8½	650	Own	Eise.	Ens.	Gas—70	Pom.	(6)
Cletrac, 12	12-20	3,300	24.94	15.52	1,734	Weid.	4—4 x5½	1,265	Own	Eise.	King.	Ker o.—11	Pom.	.....
Cletrac, 20	15-25	4,775	30.15	20.73	1,840	Own	4—4 x5½	1,375	Own	Eise.	Till.	Gas—11	Pom.	.....
Cletrac, 30	30-45	7,223	48.62	36.43	2,799	Wis.	6—4 x5	1,577	Wis.	Eise.	Scheb.	Gas—30	Pom.	Purol.
Cletrac, 40	40-55	12,038	63.0	39.61	2,637	Wis.	6—4½x5	1,575	King.	(3)	Scheb.	Gas—40	Pom.	Purol.
Cletrac, 80-60	60-96	21,100	(2)	(2)	(2)	Wis.	6—5½x6½	1,050	King.	(3)	Scheb.(4)	Gas—72	Pom.	Purol.
Cletrac, 100	100-120	.....	(2)	(2)	(2)	Wis.	6—6 x7	1,000	King.	(3)	Scheb.	Gas—100	Pom.	Purol.
Linn	.....	14,000	(2)	(2)	4,500[1]	Wauk.	6—4½x5¾	1,500	Wauk.	Scint.	Scheb.	Gas—58	Air-M.	H.W.
McCormick-Deering Trac-TracTor	10-20	7,350	(2)	(2)	(2)	Own	4—4¼x5	1,000	Own	Own	Own	Kero.—26	(5)	(5)
National Track-Tractor	25	5,250	33	25	4,900	Cont.	4—4¼x5	1,200	Cont.	Bosch	King.	Gas—25	Own	(5)

(1)At 7.15 miles per hr.—not a Nebraska test figure. (2)Not tested. (3)No magneto used. Ignition by Delco-Remy system with Willard battery. (4)Two carburetors used. (5)Make not reported. (6)None used. (7)Type not reported. (8)Not reported. (9)When turning to the left .35 ft. to the right. (10)Front; rear, 538. (11)Front; rear, 536. (12) Front; rear 534. (13)Also 713 and 960. (14)Also 288 and 388.

sion case and motor and protection from twisting stresses. The drawbar, equipped with a shock absorber, is a specially-designed, swinging type attached to the frame.

Waukesha motors, of the 4-cylinder type, equipped with Ricardo heads are used in the three models. An automatic lubrication system provides sufficient oil to vital parts regardless of the speed of the engine. Standard equipment includes a Bosch magneto, a water-proof impulse starter, a built-in governor, and a dust filter.

In the transmission mechanism, differential gearing has been eliminated in favor of a bevel-gear drive to the two steering clutches. The latter are of the multiple dry-disk type, protected from the oil in the transmission by sealed compartments. Steering brakes, which operate in conjunction with the clutches, permit the tractor to execute extremely short turns. The final gear reduction is made through a pinion-and-gear drive to the crawler sprockets.

Caterpillar Fifteen with canopy top.

Bates crawler treads are designed with wide rail-heads to insure long life. The truck wheels are equipped with removable alloy-steel rims, and each wheel is provided with an oil-well in the hub to provide ample lubrication.

The Caterpillar

The Caterpillar tractor was the original gasoline-engine-powered tractor to employ the track-type mechanism for propulsion, it having been placed on the market in 1905. Since that time, the Holt Mfg. Co. and the C. L. Tractor Co., pioneers in track-type tractor design, have combined, forming the present Caterpillar Tractor Co., with its main office at Peoria, Ill.

Five sizes of machines are built—the Ten, Fifteen, Twenty, Thirty and Sixty ranging in capacity from 10 to 50 hp. at the drawbar. All models employ the unit-type construction, the motor-and-transmission housing being used as the frame. In the Sixty, an additional frame extends forward from the transmission housing to carry the engine.

Caterpillar engines are specially designed for tractor service. They are of the 4-cylinder valve-in-head type, with cylinders cast enbloc in the Ten and Fifteen models. In the larger models the cylinders are cast separately. Pistons are gray-iron castings, with full-floating pins. The standard equipment includes a centrifugal flyball-type governor located in the timing-gear housing, an air cleaner on the carburetor intake, a magneto with impulse-type starter, and a water-circulation pump. The engine is lubricated by a positive-driven pump which supplies oil to all vital parts. Pistons, cams, and tap-

SPECIFICATIONS OF CRAWLER TRACTORS

Power Transmission						Running Gear			Length of Crawler on Ground (in.)	Height of Drawbar from Ground (in.)	Road Clearance (in.)	Equipment Power Data				Name and Model Number of Tractor
Make and Type of Flywheel Clutch	Road Speeds (m.p.h.)					Method of Steering	Turning Radius (ft. & in.)	Width of Crawler (in.)				Belt Diam. (in.)	Pulley Face (in.)	Belt Pulley Speed (r.p.m.)	Power Take-off Speed (r.p.m.)	
	1st	2nd	3rd	4th	Rev.											
Own, S. D. P.	1.82	2.71	4.01	.....	2.13	M. D. C.	8—0	13	67	17	.....	12	8¾	930	527	Allis-Chalmers, 35
Own, S. D. P.	1.8	2.76	4.08	.....	2.06	M. D. C.	9—6	13	85	14⅞	.....	12	8¾	1.000	1.000	Allis-Chalmers, 50
Own, S. D. P.	1.4	2.45	3.28	.....	2.5	M. D. C.	12—4	16	96¾	14½	.....	14	11	420 [13]	169[14]	Allis-Chalmers, 75
Twin D.	1.75	2.75	3.75	.....	1.75	C. B.	(8)	12	.....	16	12	12	8½	850	.....	Bates, 35
Twin D.	1.75	2.75	3.75	.....	1.75	C. B.	(8)	14	84	16	14	12	8½	850	.....	Bates, 45
Twin D.	1.5	2.75	3.75	.....	1.25	C. B.	(8)	18	104	19½	17	16	10½	620	.....	Bates, 80
Own, S. D. P.	2	2.6	3.5	.....	2.1	C. B.	8—¾	8	51	10½	9¼	9½	6½	1,050	1,500[10]	Caterpillar, Ten
Own, S. D. P.	2	2.6	3.6	.....	2	C. B.	8—8¼	10	54½	12¼	10⅞	10½	6½	950	1,250[11]	Caterpillar, Fifteen
Own, S. D. P.	1.8	2.6	3.6	.....	2	C. B.	9—7½	11	57	15¾	12	11⅝	6½	.....	1,100[12]	Caterpillar, Twenty
Own, D. D. P.	1.75	2.62	3.62	.....	2	C. B.	10—9⅛	13	62	16½	11½	12	7	850	.....	Caterpillar, Thirty
Own, T. D. P.	1.91	2.56	3.67	.....	1.35	C. B.	12—8½	16	79½	19½	14	16	10	650	.....	Caterpillar, Sixty
Borg&Beck, S.P.	3.36	.....	.....	.....	2.0	P. G. B.	6—0	8	50	.....	12	8	6	1,250	.....	Cletrac, 12
Borg&Beck, S.P.	2	4.22	.....	.....	1.75	P. G. B.	9—0	9½	61	.....	8	12	6	860	680	Cletrac, 20
Borg&Beck, S.P.	2.75	3.2	4.88	.....	2.6	P. G. B.	10—0	12	67	8½	.....	15	8½	745	745	Cletrac, 30
Borg&Beck, S.P.	2.14	3.56	5.63	.....	2.2	P. G. B.	11—0	14	80	8	.....	20	13	560	560	Cletrac, 40
Borg&Beck, S.P.	1.75	2.5	3.6	.....	2.1	P. G. B.	15—0	17	97	16	.....	24	15	477	477	Cletrac, 80-60
Borg&Beck, S.P.	1.75	3.25	5.4	.....	2.875	P. G. B.	17—0	19	112	12	.....	24	15	477	.....	Cletrac, 100
Brown-S. D.	1.2	2.2	3.7	7.15	1	F. W.	30—0[9]	.....	40	.....	13½	.....	.....	.....	.....	Linn
Own[7]	2	2.75	4	.....	2.5	P. G. C.	5—0	12	56	12	.....	15¼	7	645	543	McCormick-Deering Trac-TracTor
D. D. D.[5]	2	.....	3	.....	2.25	C. B.	8—8	10	.....	13¼	12½	14	7	.....	.....	National Track-Tractor

ABBREVIATIONS—Air-M., Air-Maze. Am. B., American Bosch. Beav. LeR., Beaver-Le Roi. C. B., Clutches and Brakes. Cont., Continental. D. D. D., Double dry-disk. D. D. P., Double dry-plate. Eise., Eisemann. Ens., Ensign. F. W., Front wheels. H. W., H. W. Filtrator. King., Kingston. M. D. C., Multiple-disk clutches. P. G. C., Planetary gears and clutches. Pom., Pomona. Purol., Purolator. Scheb., Schebler. Scint., Scintilla. S. D., Single disk. S. D. P., Single dry plate. S. P. Single plate. T. D. P., Triple dry plate. Till., Tillottson; Twin D., Twin Disc; Wauk., Waukesha; Weid., Weidely; Wis., Wisconsin; Zen., Zenith.

pets receive oil from the splash of the crankshaft.

Differential gearing in the Caterpillar transmission is eliminated in favor of a bevel-gear reduction directly to the two steering clutches. The flywheel clutch is a double dry-plate type, hand-operated. The steering clutches are of the multiple dry-disk type, the faces of which are lined with a molded clutch lining. Each clutch is operated from a separate hand lever, the release of one permitting the tractor to turn in that direction. Short turns are accomplished by braking the steering-clutch drum.

Heavy steel-channel sections make up the track-roller frames. The weight of the engine and transmission is carried in front by a leaf spring which is pivoted at the center under the engine crankcase and rests, at its ends, on the track-roller frame. In the Sixty, a steel equalizer bar having an I-beam cross-section is used in place of a leaf spring. The ends of the bar rest on coil springs mounted on the track-roller frame. At the rear end of the tractor the weight is carried by pivot shafts rigidly attached under the transmission case and extending to the track-roller frame, where the ends of the pivot shafts are mounted in heavy bearings.

Caterpillar tracks are of the built-up type, consisting of steel shoes bolted to steel links. Special grouter attachments are available to operate in any type of surface condition.

The Cletrac

Six models of crawler tractors with a power range from 12 hp. to 100 hp. at the drawbar are made by the Cleveland Tractor Co., Cleveland, O. Five models, the Cletrac 20, 30, 40, 80-60, and 100 are designed for industrial service while the Cletrac 12 is designed for general farm use.

Four-cylinder motors are employed on the 12 and the 20, and 6-cylinder motors on the larger machines. All motors are of the valve-in-head type, with cylinders cast enbloc. A gear-pump provides lubrication to the engine parts, and an oil-pressure relief valve by-passes excessive oil to the timing gears. Flyball governors and Eisemann magnetoes are standard equipment on the 12, 20 and 30 models. Kingston governors and Delco-Remy starting, lighting and ignition units with Willard 12-volt batteries are standard on the Models 40, 80-60 and 100. Carburetors furnished include Schebler, Kingston, and Tillotson. All intake air passes through Pomona clarifiers.

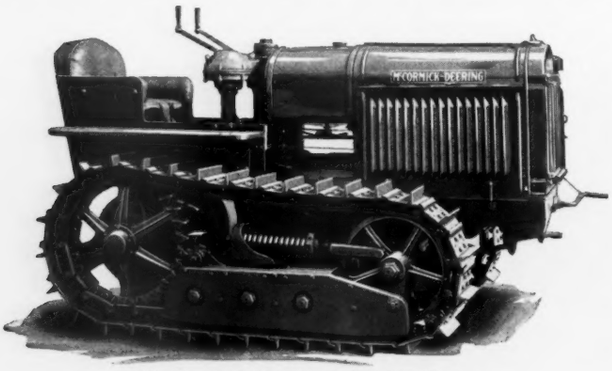
Cletrac transmissions are of the selective type, with three speeds forward for the larger machines. The Model 20 has two speeds forward, and the

Cletrac 80-60 tractor.

Model 12 one speed forward. All models have one reverse speed. Borg & Beck pull-type, single-plate clutches are used on all models.

Steering is accomplished on the Cletrac by the application of a brake on either side by the steering gear. The retarded motion on the braked side causes the opposite track to speed up as a planetary compensating differential transmits power from the transmission to the tracks.

Cletrac track-wheel assemblies feature "one-shot" pump lubrication. All lower track-wheels and upper track-wheels receive oil from hand-lever-operated pumps located near the operator's position. This method simplifies the operation, eliminating the necessity of scraping off mud and the cleaning of grease cups.



McCormick-Deering TracTracTor.

McCormick-Deering

In response to the demand for a crawler tractor for difficult soil conditions, the International Harvester Co. of Chicago, Ill., has added the TracTracTor to its line of Harvester tractors which include the McCormick-Deering 10-20, 15-30 and the Farmall. Some of the features of design of the machine include free track oscillation, self-cleaning track, and convenience of control.

The TracTracTor employs the same engine as does the McCormick-Deering 10-20. This is a 4-cylinder motor operating at a governed speed of 1,000 r.p.m. It is built with removable cylinders. Standard equipment includes an International E4A magneto with an impulse starter and cleaning devices to remove foreign material from the air and the fuel. The engine is lubricated by a splash and circulation system, a positive-driven gear pump furnishing the circulation. An oil filter is standard equipment.

The steering clutches are located above the transmission in individual housings. Power from the transmission is applied to the track through a new-design mechanism, consisting of a clutch followed by a worm-gear drive to a set of planetary gears which, in turn, transmit the power through a final gear reduction to the sprockets. Steering is accomplished by releasing the worm through the steering clutch, thereby allowing the planetary gears to rotate freely about their own pinions and to transmit no power to the final gear and sprocket, and causing the other track to turn the machine. When steering is not accomplished by the clutches alone, the pedals assist by contracting the bands on the brake drum.

The weight of the tractor is carried on three track rollers in each track frame. Provision is made for adjusting the track through the front idlers. Should any foreign substance get into the sprocket, idler or track, the track spring will collapse to prevent damage. The track frame can be removed as a unit by first removing the chain and the pivot shaft.

Three speeds forward—2, 2¾, and 4 mi. per hr.—and a reverse speed of 2½ mi. per hr. are provided by the transmission gearing.

National Track-Tractor

A newcomer in the crawler-tractor field, the National Track-Tractor, bids fair to receive recognition as a machine of capability and excellent design. It is built by the National Brake and Electric Co. of Milwaukee, Wis.

The engine of the National is a Continental 4-cylinder unit, developing 30 hp. at 1,200 r.p.m. It has full force-feed lubrication and is equipped with a governor, an air cleaner, a water pump, a magneto and an impulse starting coupling.

One of its transmission features is the bevel-gear first reduction, followed by spur-gear reductions, which is claimed to reduce loss of power between the engine and drawbar. Final-drive gears are inclosed in a dust-proof housing, operating in a bath of oil. The steering clutches are of the multiple-disk type.

A front axle, mounted to the tractor between the transmission and the engine and suspended on coil springs mounted on the track-roller frame, provides equalization of the tractor weight and braces the roller frames.

National Track-Tractor with bulldozer.

The track-roller frames are of built-up riveted channel-iron section, the rollers are high-carbon-steel drop forgings, and the track-links are open-hearth steel castings designed for additional grouters or street shoes as required.

At a speed of 2 miles per hour, the National will develop a drawbar pull of 4,900 lb. and, at 3 miles per hour, 3,400 lb. The belt-horsepower is rated at 30.

The manufacturer builds a number of attachments especially designed for use with the National. Among these are a 110-cu. ft. air compressor with a pressure tank and belt-drive from the power take-off; an elevator-conveyor designed especially to be of use in stock-piling; a hoist attachment capable of developing a 7,500-lb. direct pull with a drum capacity of 250 ft. of ½-in. cable; and a back-filler attachment and track fenders.

Crawler Attachments

A number of crawler attachments are now on the market for converting wheel-type tractors into

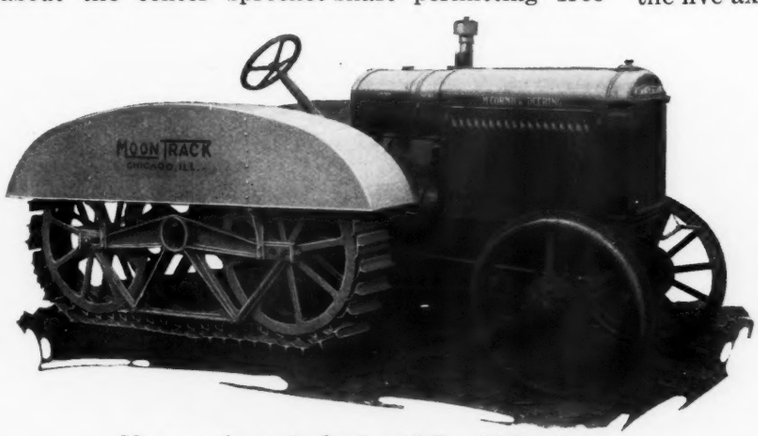
crawler machines. These attachments convert the McCormick-Deering, Allis-Chalmers Industrial, Fordson and other standard makes of tractors commonly used for farm service into machines capable of the performance characteristics of full-crawler machines. Many of the attachments are equipped with gear reductions to lower the speed, thereby materially increasing the drawbar pull. The large ground contact provided by the crawler treads, with the resulting low pressure per sq. in., adds greatly to the utility of these machines.

Warco Almatracs

Two sizes of full crawler attachments are made by the W. A. Riddell Co., Bucyrus, O., adaptable for the McCormick-Deering Model 15-30 and Model 20 tractors. Alwatracs have a tread chain of the rigid-rail type fitted with either 12-in., 16-in. or 18-in. treads. The unit is controlled by clutches of the expanding ring type, completely enclosed. When pressure is applied to the brake drum, the clutch is automatically disengaged, thus holding the track affected and enabling the machine to turn on a very short radius. With 16-in. tracks, a ground contact of 2,400 sq. in. is obtained. Three speeds forward, from 1.28 mi. per hr. to 2.65 mi. per hr., and one reverse speed of 1.85 mi. per hr. are obtained when the engine is operating at 1,000 r.p.m.

Moon Tracks

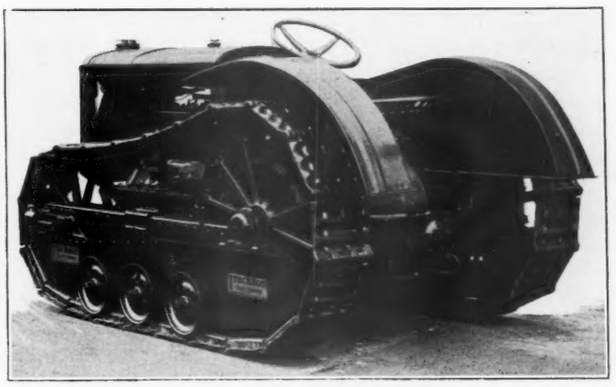
Moon Tracks are of the semi-crawler type, that is, the track mechanism merely takes the place of the rear wheels. The usual front wheels are retained, and are used to steer the machine. Essentially, the Moon Track consists of a center-drive sprocket with one idler in front and one idler in the rear, the periphery of the three-wheel unit being surrounded by the track-link chain. The unit pivots about the center sprocket-shaft permitting free oscillation over any obstruction. Two models are built, one for the McCormick-Deering Model 10-20 and another for the McCormick-Deering Model 15-30. The former has a ground contact of 1,230 sq. in.; the latter 1,560 sq. in. The Moon Track Co. is located in the McCormick Bldg., Chicago, Ill.



Moon crawler tracks fitted to McCormick-Deering tractor.

Trackson Crawlers

The Trackson Co., of Milwaukee, Wis., manufactures several models of crawlers for use with the Fordson, McCormick-Deering, Allis-Chalmers Industrial, and other standard makes of wheel-type tractors. All models of Trackson crawlers employ heavy electric-alloy-steel track castings with a corrugated track designed to not mar road surfaces. Sprockets are designed with staggered, self-cleaning teeth, and all bearings are protected against sand and dust. Wheel bearings are provided with an oil reservoir and the ring-oiling method of lubrication.



Trackson-Allis Chalmers full crawler machine.

For the McCormick-Deering, two models of crawlers are available, the DH and LH. The DH model is a heavy-duty unit employing 12-in. tracks with 1,647 sq. in. of ground contact. By means of an internal-gear drive, consisting of a pinion meshing with an internal gear on the rear-drive sprockets, one-third the normal speed of the wheel tractor is obtained, resulting in greatly increased draw-bar pull. Model LH is designed for the 10-20 size McCormick-Deering. It is a lighter unit and utilizes the live-axle drive of the tractor, at standard wheel-type speeds. It has 1,440 sq. in. of ground contact with 12-in. treads.

For the Fordson, the Model F Crawler has been designed. This model is similar to the LH and produces a 2-ton crawler tractor of good performance characteristics. The tracks are 9⅝ in. wide and have 1,100 sq. in. of ground contact. Regular Fordson speeds are maintained.

Two models are also manufactured for the Allis-Chalmers United models. They are known as the GU and LU units. Essentially they are similar in design and construction to the other Trackson models. The GU Trackson has its own internal-gear-drive speed reduction. This, with the four-speed transmission of the tractor, gives the machine a tremendous power. Another feature of this model is its variable-height front axles, which make it possible to change the ground contact at the front of the crawlers for various kinds of work. The model GU has 1,750 sq. in. of ground contact. The LU model, a lighter unit, also is designed for the Allis-Chalmers United.

All models of Trackson crawlers have a ground pressure less than 4½ lb. per sq. in.

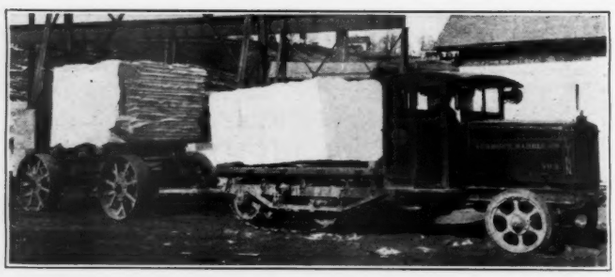
Trackson-Allis-Chalmers

The Trackson-Allis-Chalmers tractor is a combination of the Allis-Chalmers Model U Industrial tractor power plant and the Trackson Co. crawler tracks. The motor and transmission housing are bolted together in the unit-type construction which eliminates a frame. Specifications of this tractor include a 4-cylinder, L-head motor operating at a speed of 1,200 r.p.m., a built-in governor, full force-feed lubrication by a gear-driven pump, an American Bosch magneto, an air cleaner, and a water pump. The transmission is a 4-speed forward, 1-speed reverse, automotive-type construction.

The Trackson crawlers of this machine will be described in a special paragraph devoted to a discussion of crawler attachments for wheel-type tractors.

Special Crawler Machines

Closely related to the regular crawler tractor are several special hauling machines designed with crawler propelling mechanisms, but of different chassis and body design. They are usually referred to as the hauling-design tractors. In general appearance, they resemble automobile trucks. Each power plant is located in front and the conventional truck body in the rear. The propelling mechanism, however, is fundamentally a crawler-tractor design, and the machine possesses many features in common with the usual tractor.



Linn tractor in operation at Vermont marble quarry.

The Linn Tractor, manufactured by the Linn Mfg. Co., Alma, Mich., is a representative machine of this type. Its construction resembles closely that of a truck, having a main frame, with the power plant mounted in front, an operator's cab directly behind, and a hoist-equipped dump-body in the rear. A Waukesha model 6-AB 6-cylinder engine, having a rating of 100 hp. at 1,500 r.p.m., forms the power plant of the Linn Tractor. The cylinders of this engine are cast in pairs, and are furnished with Ricardo heads. Standard items of equipment include a Waukesha built-in, non-hunting governor; a Schebler 1½-in. carburetor, an Air-Maze air cleaner, a Scintilla magneto with impulse starting coupling, and an H. W. Filtrator for oil filtering. Lubrication is provided for all vital engine parts by a gear pump that develops 50-lb. pressure.

The transmission is a Brown-Lipe, Model 70, overhead-shift unit having three-point suspension. Four forward speeds and 1 reverse speed are available in the standard equipment. Optional equipment, at extra cost enables the tractor to travel reverse in four speeds from 1 to 6¾ mi. per hr. The forward speeds permit a range from 1.2 to 7.15 mi. per hr.

A Brown-Lipe-Chapin heavy-duty differential transmits the power from the transmission to the final drive. The latter is of the double-reduction, enclosed-gear type, running in a bath of oil.

The crawlers of the Linn machine are flexible in action, that is, the treads maintain a normal contact over obstructions or uneven ground. This is accomplished by carrying the weight of the truck on a rocker arm which, in turn, transfers it to runner blocks that ride on rollers. These rollers are arranged in a chain, free to travel on the inside of the crawler treads. In other words, the truck weight is carried on a roller chain traveling within the crawler-tread chain.

Double driving sprockets and double idling wheels are used on each crawler. The treads are 14-in. wide and 8-in. long. The driving sprockets engage the treads near the outer edge. With its 40 in. of track on the ground and the truck-body fully loaded, the ground pressure is 27 lb. per sq. in. In addition to hauling a 10-ton load on the truck body, a 50-hp. draw-bar pull is available for towing.

Two types of chassis construction permit the mounting of dump and platform bodies, or logging equipment.

Several advantages are claimed by the manufacturers for this type machine. Since its motor is mounted far to the front, the tendency of the crawlers, when loaded, to lift up in front is eliminated. Because of the flexible feature of the crawler mechanism, no loss of tractive effort occurs when the crawler rides over an obstruction. By means of front-wheel steerage, simpler control is assured when operating on down grades. However, the long wheel-base of the machine does not permit short turns.

Hughes-Keenan Iron Mule

The Iron Mule, manufactured by the Hughes-Keenan Co., Mansfield, O., is another special adaptation of crawlers. While not of the truck-type construction, this machine carries a superimposed load. Essentially, it consists of a power-hoist dump-body mounted on a McCormick-Deering crawler-equipped tractor whose direction has been reversed. The reversal of direction is accomplished by the installation of special reversing gears in the drive axle, this being in keeping with

Hughes-Keenan Iron Mule.

the principle that it is easier to pull than to push a load.

In order that the operator can face in the direction of travel, his seat is reversed. This enables him to look over the dump body, and to easily spot the machine for loading or dumping. The transmission levers and the steering gear are likewise transposed to the new operating position.

The body of the Iron Mule is designed for a 4-cu. yd. capacity. It is built of steel plate, one side having a 6-in. removable section for use with elevating graders.

The crawlers of the Iron Mule are of special design with the assembly trunnioned about the drive axle, to permit free oscillation over obstacles. No load is carried on the drive axle. Crawler treads are 16-in. wide and provide 10 sq. ft. of ground contact. The wheels at the radiator end are of heavy-duty construction, 29 in. in diameter.

Iron Mules are designed for short-haul operation—up to distances of 600-ft.—unless surface conditions warrant their use economically on longer distances. They are particularly adapted to the hauling of overburden and quarry raw material.

Crawler-Tractor Equipment

One of the determining factors in the success of a tractor is the selection of equipment which is to be powered. A tractor is a means of locomotion and power. Unless properly harnessed, the inherent power of the machine may be wasted. Often, wagons with the familiar wooden wheels have been called upon to transport heavy loads over surfaces which would ordinarily test the ability of crawler treads and, naturally, they have failed. Likewise, the efficiency of many dirt-removal jobs has been lost because the wrong type or size of equipment was selected.

Prospective purchasers of crawler tractors and materials-handling equipment will do well to study the specifications of the equipment in question as well as their own operating conditions.

Bulldozers

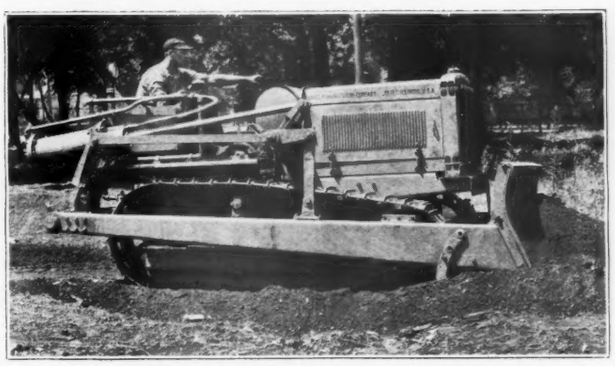
As one of the important uses for tractors in the pit and quarry industries is the spreading and leveling of waste materials, a bulldozer is a necessary equipment item in any tractor-equipped plant. There are many other uses for bulldozers. Built primarily for pushing anything within the power of the tractor, a bulldozer is capable of scraping and repairing roads, assisting a stalled truck, plowing snow and performing other utilities of a similar nature. Some of the representative makes on the market are described here.

The Ateco hydraulic bulldozer consists of a steel frame-work bolted to the main frame of the tractor with the bulldozer blade and the two side-arms pivoted on pins bolted to the truck-wheel frame. A hydraulic cylinder mounted on the steel frame-work over the tractor operates a lifting arm which is connected by chains to the blade. In operation, the movement of a lever actuating the hydraulic cylinder raises or lowers the blade with a rapid and accurate action. Two sizes are made. The B-8 has an 8-ft. blade for a 30-hp. tractor, and the B-10 has a 10-ft. blade for a 60-hp. tractor. The Ateco bulldozer is manufactured by the American Tractor Equipment Co. of Peoria, Ill., and Oakland, Cal.

Several models of bulldozers are included in the line of the Baker Mfg. Co., Springfield, Ill. The No. 20 and No. 21, similar in design, are suited for the Caterpillar Twenty and Ten models, respectively. Both models of bulldozers are equipped with a pivoting moldboard which permits the blade to ride on runners when the tractor backs up, clearing any obstruction without the necessity of raising the blade.

A larger model, the No. 24, is built for the Caterpillar Sixty. This model is mounted on H beams pivoted on brackets mounted on the truck-wheel frames. A rear cross-bar is attached to the tractor drawbar. By means of two hydraulic rams, the blade is raised and lowered from a lever control on the operator's seat. Oil pressure for the rams is supplied from a gear-pump driven from the tractor transmission. The cutting blade and moldboard on this model is 9 ft. 9 in. long.

The Bates bulldozer is designed and built for the



Bates bulldozer on Bates tractor.

Bates Steel Mule Models 35 and 45 tractors. The frame of the bulldozer completely surrounds the tractor yet does not interfere with its normal operation nor with the drawbar. This frame is bolted to the crawler frame at the back of the tractor, and the lifting mechanism is bolted to the tractor frame just behind the engine. By the action of the lifting mechanism, located half-way between the pivot point and the blade, the weight is thrown to the front, holding the blade into the ground to do the work. Adjustable shoes are mounted on the frame back of the blade to serve as front runners. The operating mechanism of the blade consists of a hydraulic cylinder, a gear-pump driven from the transmission, and a three-way control valve located at the operator's seat. Three positions on the valve raise and lower the blade or by-pass the oil to the supply tank holding the blade in a set position. The Bates has a blade 7 ft. 6⅝ in. long. It is manufactured by the Foote Bros. Gear & Machine Co., Chicago, Ill.

Five models of bulldozers are made by the La-Plant-Choate Mfg. Co., Cedar Rapids, Ia., exclusively for use with Caterpillar tractors. The BD-10 and BD-15 are designed for the Caterpillar Ten and Fifteen respectively, while the BD-20, BD-30 and BD-60 are made for the Twenty, Thirty and

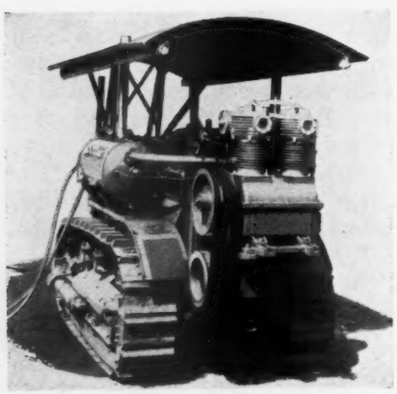
LaPlante-Choate bulldozer piling rip-rap rock.

Sixty models. LaPlant-Choate bulldozers are pivoted in the center, with the pivot mounting located on the truck-wheel frame. A hydraulic-lifting device is located on the rear of the tractor. This construction permits the blade to float and to maintain a proper working level through gravity. The blade can be locked in any position desired. Oil for the hydraulic cylinder is supplied from a gear-pump driven from the power-take-off shaft. The blade is made of reinforced-steel plate built close to the tractor front. The rear drawbar is left free and clear.

Operated by power from a winch on the rear of the tractor, the Miami bulldozer is somewhat different in design from the usual hydraulic-cylinder operating device. The reinforced frame upon which the cable sheaves are mounted is attached to the track-frame by special steel castings which permit the blade to accommodate itself to any ground inequality, thus minimizing any tendency for the blade to gouge. Side-beams are attached to the truck-wheel frames. No interference is made with the tractor drawbar. The Miami bulldozer is made by the Miami Trailer-Scraper Co., Troy, O.

Air-Compressor Attachments

Air-compressor attachments are of great service to quarry operators, providing a means of supplying compressed air to drilling tools and other quarry machinery. They are of especial use in the opening of a new quarry where the tractor is used for stripping loose overburden and strata of undesirable stone. Drill tools are rendered available in the blasting of this undesirable material.



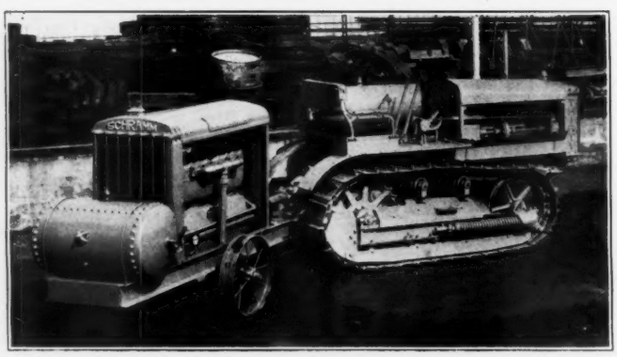
Davey air-compressor attachment.

The Davey air-cooled compressor is designed to permit rear mounting on the Caterpillar Twenty. It has two cylinders, air cooled, with a 6-in. stroke and 6-in. bore. Each cast-iron piston is equipped with four piston rings. The unit has a capacity of 142 cu. ft. of free air per min. at 725 r.p.m. and a horsepower rating of 25 at 80-lb. pressure. It has its own oil pump for proper lubrication of working parts. A V-belt drive transmits the power from the take-off of the tractor to the compressor. The Davey compressor is made by the Davey Compressor Co., Kent, O.

Compressor heads and manifolds on the Davey machine are of special aluminum alloy, cast with deep fins to give greater radiating area. Of all commercial metals, aluminum is the most rapid conductor of heat. High temperatures generated inside the compressor head are instantly passed through the aluminum walls, preventing any possible "piling-up" of heat within the compressor. As a result, it is said that even after hours of steady running, one can lay his flat hand on the compressor heads.

Schramm Inc., air-compressor manufacturers of West Chester, Pa., build a complete line of air compressors for drive from the power take-off of the various sizes of Caterpillar, Cletrac, Allis-Chalmers, McCormick-Deering and Case Industrial tractors.

In each case the compressor is shipped ready to attach, without any change being necessary in the



Schramm compressor; note flexible power-take-off drive.

standard tractor. The compressor is attached to the tractor by means of a universal drawbar coupling, which bolts onto the crosspiece of the tractor drawbar. Its drive is taken from a power take-off shaft through a double universal coupling and a long spline shaft coupling, which connects to the tractor power-take-off shaft.

The flexible hook-up lends itself to any bumpy road condition and turns. The self-propelling feature of these tractor-compressor combinations makes them ideal for the operation of pop-hole drills, plug drills, heavier-model hand-held or tripod-mounted rock drills.

A Schramm compressor can be uncoupled easily and the tractor used for other pulling or power purposes. On hauling, especially, the full power of the tractor is available. The power take-off of the tractor is available for operating other power-driven units.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

L. ALTON HUTCHINS
Chief Chemist
Wolverine Portland Cement Co.
Coldwater, Mich.

Personal Mention

Henry F. Koch, president of the Koch Sand & Gravel Co. of Evansville, Ind., is directing the efforts of the unemployment committee of Evansville to alleviate conditions there.

M. B. Lanier, chairman of the board of the Kentucky Stone Co , Louisville, Ky., has been elected a director of the Freeport Texas Co. Mr. Lanier is also president of the Kentucky Electric Power Co. of Louisville.

J. L. Von Glann has placed a new quarry and plant in operation near Spartanburg, S. C., which is said to be capable of turning out 500 tons of crushed rock daily.

Vincent Sloan of Chicago, manager of the Waushara Granite Co., has been at the company's quarry and plant at Redgranite, Wis., most of this month supervising the laying of new spur tracks and the installation of a steam shovel. Other improvements are contemplated.

M. F. Pratt, Rochester, N. Y., has been elected vice-president of Victor Plaster, Inc., to succeed S. Firestone, recently deceased. This is Mr. Pratt's first connection in the mineral industry.

J. B. Downey, Phoenix, Ariz., has been appointed district sales representative for the state of Arizona, by Dayton-Dowd Co., of Quincy, Ill., manufacturer of centrifugal pumps.

Henry Eggers, president of the McFarlane-Eggers Machinery Co., Denver, Colo., has not recovered sufficiently from a serious injury that he sustained June 11 to permit his return to business. While driving leisurely along a highway near Denver his automobile was struck head-on by another car driven by a Mexican, on the wrong side of the road. Mr. Eggers did not recover consciousness for nearly five weeks, his skull being fractured halfway round.

Herbert H. Rice, of Detroit, assistant to the president of General Motors and treasurer and director of the National Automobile Chamber of Commerce, has been appointed chairman of the commission for the United States created to study the construction of a highway to connect the northwestern part of the United States with British Columbia, Yukon Territory and Alaska. The other members of this commission are **Ernest Walker Sawyer,** representing the department of the interior, and Major **Malcolm Elliott,** U. S. Army, president of the Alaskan road commission.

Charles O. Portfors and **Frank A. Jones** were elected members of the board of directors of the Sewell Lime Co. of Orofino, Idaho, at a recent meeting of the directorate.

K. L. Graham, recently purchasing agent for the Peerless Cement Corp., has been made general purchasing agent for this company, the Bessemer Cement Corp. and the Federal Portland Cement Co. His duties will cover the requirements of plants at Detroit and Port Huron, Mich., Bessemer, Pa., and Buffalo, N. Y., with headquarters at the Bessemer plant.

Frederick O. Anderegg, Ph.D., formerly associate professor of physical chemistry at Purdue University, and more recently senior industrial fellow at the Mellon Institute of Industrial Research, in charge of investigations of Portland cement and masonry, announces the opening of a consulting practice on building materials including Portland cement, cement products and masonry, at 206 Fulton Building, Pittsburgh, Pa.

Thomas W. Bacchus, vice-president of the Hercules Powder Co., was the honored guest at a *bon voyage* dinner given by about sixty officers and members of the Hercules Powder Co., Thursday evening, Dec. 11. The dinner was in the nature of a testimony to the high regard in which Mr. Bacchus is held by his associates, it being held just previous to his sailing with his family for a trip around the world. Mr. Bacchus has been in the explosives business for 38 years and was associated with the original Hercules Powder Company in 1893.

Joseph J. Kennedy, vice-president and treasurer of the Ward Sand & Gravel Co., Detroit, Mich., has been elected a director of the Bankers Trust Co., Detroit.

Howard Bruce and **John K. Shaw,** members of the Maryland state roads commission, have resigned, but will remain in office at the governor's request until the general assembly carries out the road program now planned.

Ralph S. MacPherran, chief chemist of Allis-Chalmers Mfg. Co., Milwaukee, and an outstanding metallurgist in cast iron, has been awarded the J. H. Whiting gold medal of the American Foundrymen's Association for his many valued contributions to the foundry industry. Mr. MacPherran, for many years a prominent and active contributor to the committee work of the American Foundrymen's Association and the American Society for Testing Materials, has been identified with the iron-and-steel industry for nearly 30 years.

B. Marcuse, president and general manager of the Canadian Asbestos Co., Montreal, recently underwent a major operation and is now reported to be getting along nicely. He will be unable to resume his duties before the end of January, however.

S. H. Taylor, Jr., has been placed in charge of the Pacific Coast offices, with headquarters at Los Angeles, Cal., for the Lincoln Electric Co., Cleveland. **L. P. Henderson** has been made manager of the San Francisco office, and **E. J. Pfister,** formerly of the Philadelphia and Allentown, Pa., offices, has become district manager of the Kansas City district.

R. G. Olson, manager, Milwaukee branch, American Blower Co., has been promoted to have charge of the Cleveland branch.

Obituary

Herbert M. Halverson, president of the Waukesha Lime & Stone Co. of Waukesha, Wis., died at the County Emergency Hospital in Milwaukee December 10 of self-inflicted revolver shot wounds. He was 38 years old and resided in Milwaukee. Besides heading the stone company, Mr. Halverson was president of I. B. Rowell Co. and a director of the First State Bank of Waukesha. He was an Elk and a Shriner. **Mrs. M. O'Laughlin Gillen,** daughter of the John O'Laughlin who founded the company in 1905, has been named president of the concern following Mr. Halverson's death.

Albert H. Younkin, 37, shovel operator in a quarry at Connellsville, Pa., operated by the Youghiogheny Crushed Stone Co., was fatally hurt when he was struck by a rock thrown 700 feet in a quarry blast recently. Mr. Younkin was eating his lunch beneath a tree when the stone struck him. He died in a hospital a few hours later.

Sumner Sollitt, widely known building contractor of Chicago, and president of the Sumner Sollitt Co., died Dec. 2. Mr. Sollitt, who was born in Chicago in 1873, had been in the building business continuously since 1888, when he was fifteen years old. In 1927 he was elected president of the Associated General Contractors of America.

Walter J. Towne, chief engineer of the Chicago & Northwestern Ry., died of pneumonia on Nov. 24 at his home in Oak Park, Ill. He was 63 years old. After attending Rensselaer Polytechnic Institute in Troy, N. Y., Mr. Towne started as a rodman on the Santa Fe and made railroading his life work, except from 1896 to 1899, when he served as assistant engineer on the New York state canal.

Coming Events

January 9-10, St. Louis, Mo. Annual convention, National Assn. of Paris Transit-Mixed Concrete Manufacturers. E. A. Landis, executive secretary, Portland, Ore.

Jan. 12-16, 1931, St. Louis, Mo. Annual convention and show, American Road Builders' Assn. Chas. M. Upham, engineer-director, National Press Bldg., Washington, D. C.

Jan. 15, 1931, St. Louis, Mo. Report of Committee on Central- and Truck-Mixed Concrete of the American Road Builders Assn., at 10:00 a. m.

Jan. 19-22, 1931, St. Louis, Mo. Annual Convention National Crushed Stone Assn., Hotel Jefferson. J. R. Boyd, secretary, 1735 14th St., N. W., Washington, D. C.

Jan. 26, 1931, St. Louis, Mo. Annual convention of National Ready-Mixed Concrete Assn. New Hotel Jefferson. J. C. Eakin, secretary, Little Rock, Ark.

Jan. 27-29, 1931, St. Louis, Mo. Annual convention National Sand & Gravel Assn., Hotel Jefferson. V. P. Ahearn, executive secretary, Washington, D. C.

Feb. 10-13, 1931, Chicago, Ill. Fifth Midwest Power Engineering Conference. G. E. Pfisterer, secretary, 308 W. Washington St., Chicago.

Feb. 24-27, 1931, Wichita, Kan. Sixth Annual Southwest Road Show and School, Exposition Building. F. G. Wieland, manager, P. O. Box 1043, Wichita, Kan.

April 13-18, 1931. Cleveland, O. National Industrial Equipment Exposition, in connection with Congress on management, maintenance and materials-handling of A. S. M. E. G. E. Pfisterer, managing director, 308 W. Washington St., Chicago, Ill.

May 4, 1931. New York, N. Y. Thirteenth exposition of Chemical Industries, Grand Central Palace. International Exposition Co., managers, Grand Central Palace, New York.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These, interesting by comparison with practices in vogue today, are printed in this column each issue.*

Fourteen Years Ago

THEN, as now, many plants were closed for the winter and some operators were not properly protecting equipment against rust and other deterioration during the inclement weather. An editorial urged the economic importance of proper care of machinery.

* * *

Many sand and stone producers were planning to attend the Chicago Cement Show, in February, at which PIT AND QUARRY had contracted for a booth.

* * *

While opening up a stone quarry along the Mississippi River, workmen found a cache of coins. However, disappointment soon displaced joy for these "silver" quarters proved to be remnants of a counterfeiting gang's spurious production, of no value either as money or bullion!

* * *

Ten Years Ago

IN an article, "The Efficiency of Blasting," A. S. Deringer, superintendent of the Kelley Island Lime & Transport Co., Cleveland, O., compared conditions when handling rock by hand with those when operating with power shovels. He discussed the differing practices necessary with varying kinds of rock, the spacing of drill-holes, and the distribution of a charge in a hole. He concluded that every case requires investigation of these details and that, in many instances, a liberal charge of black blasting powder used with dynamite will give excellent results and prove economical.

* * *

The Nebraska Mineral Aggregate Assn. met Dec. 15 in the Hotel Fontanelle, Omaha. The Missouri Valley Assn. of Sand and Gravel Producers met Dec. 16-17, at Kansas City, Mo. The Indiana Sand and Gravel Assn. met at Indianapolis Dec 1-2, and the Indiana Crushed Stone Assn. held its annual meeting at the Claypool Hotel, Indianapolis, Dec. 16.

* * *

Five Years Ago

IN forecasting the lime industry, Oliver Bowles, superintendent of the non-metallic minerals experiment station of the U. S. Bureau of Mines, advised operators to strive for a reduction in their fuel costs and to pay more attention to efficient, durable kiln linings. He discussed the common practice of rapidly depleting the most favorable outcrops without rendering available less convenient ledges that are essential for continued operations.

* * *

A. T. Goldbeck, director of the Bureau of Engineering, National Stone Assn., reviewed the progress and practical value of highway research. These studies covered road subgrades, blanket courses under pavements, drainage, concrete-road design, and road materials. The soundness test for coarse aggregates was being put to practical use.

Owing to a congestion in the rail shipment of building supplies into Florida, the United States Gypsum Co. resorted to ocean shipments. The "Gaston" was chartered from the Southgate Marine Corp., Norfolk, Va., to make two round trips per month between New Orleans, La., and Miami, Fla., carrying 1,000-ton cargoes of plasters and wallboards. The company also put into service its tug "Gypsum King," towing the 3,000-ton barge "F. W. Fancher" between New York and points in Florida.

* * *

A two-page spread, in color, advertised the Packard gasoline locomotive made by the Fate-Root-Heath Co., in use by the Grove Stone & Sand Co. of Asheville, N. C.

Texas Sulphur Deposits Exceed 40,000,000 Tons

Estimates of the world's reserves of sulphur by the United States Bureau of Mines vary from 56,000,000 metric tons to nearly double that amount. Italy and the United States are reported to have the largest reserves, Italy's resources amounting to 25,500,000 metric tons. However, the deposits in Texas alone probably contain in excess of 40,000,000 tons of sulphur without allowance for recent discoveries. Other occurrences in the United States are not included in these estimates, such as those of Culberson County, Texas, where an immense tonnage is reported to exist, nor are the Louisiana sulphur deposits included in the estimates.

Texas is now supplying about 99 per cent of the domestic sulphur produced in the United States, which amounted to 2,439,378 tons in 1929.

More Consideration of Bearing Alloys Is Urged

Manufacturers who use babbitt generally consider that this alloy and the bearings made therewith are such simple things that they do not merit research. However, L. D. Staplin, president of Carbonite Metal Co., Inc., Chicago, Ill., holds that this assumption is erroneous and that it accounts for much waste and needless shutdowns resulting from defective bearings. He states that there are three different alloys that are suited to the bearing needs in the industries which handle the non-metallic rocks and minerals and he plans to discuss this topic in an address before the National Crushed Stone Assn. during its St. Louis convention. His company maintains a free consulting service to users of bearing metals.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Imports Still Affecting Seaboard Cement Sales

One of the brighter aspects of the cement situation at the close of 1931 is that, before long, all the companies that accepted large orders for future delivery at the quotations established in August, 1929, will have filled their commitments at those prices and will be in a position to ship at present levels, which, though still low, represent some advance from the bottom. In August, 1929, following price shading by a few companies, a general cut was made of 30 cents a barrel in the eastern markets outside of New York City. In the latter territory, a reduction of 20 cents brought the price to $1.83 a barrel. In other sections of the country, the cut also was 20 cents a barrel. Those reductions brought quotations to a point that allowed little if any profit to many producers. Before prices were restored to their previous levels in the following November, heavy commitments for future delivery had been made by many manufacturers with the result that they have been shipping a good part of their output at the low August figures.

Foreign importations, notwithstanding the imposition of a tariff of 23 cents a barrel, still exerted a malign influence during the year. While importations were small in the aggregate when compared with the country's consumption and are limited to the seaboard, they become important when dumped into a restricted territory, causing domestic mills serving those sections to curtail production, to meet the price of the European product or to seek other markets. In the last-named instance, the American manufacturer is forced to invade sections already well supplied, with the result that additional competition with its consequent cutting of prices ensues.

The present import duty is considered by the cement industry as entirely inadequate to solve the problem of foreign competition. The European producer, with labor charges only one-fifth of those applying in the United States and with the transatlantic shipping companies eager to give a minimum rate to help load their ships on the westbound passage, is able to land cement in this country at an extremely low price. Foreign cement is being sold on the pier in New York at $1.70 a barrel, a price the American producer is unable to meet without incurring a loss. The price of the domestic product in New York, packed in similar containers of paper and less all discounts, is $1.95 a barrel, a quotation that outside of the August-November, 1929, period is around the record low of recent years.

Little European cement has been landed in Boston recently, due to the fact that the domestic producers have maintained in that market the depressed price which they put into effect some time ago, to meet foreign competition. That price of $1.80 a barrel, representing a loss to the manufacturer, has forced the European shipper to seek other ports of entry.

International Earnings Record Is Outstanding

International Cement Corp., one of the leaders in the field of cement manufacture in the United States, now has an aggregate plant capacity of 22,300,000 bbl., the capacity having been tripled during the past five years. Aside from the United States properties, International also has plants in Cuba, Argentina and Uruguay.

Although there has been a general excess of capacity in the cement industry and price-cutting has been prevalent in recent years, International has maintained a good average of earnings, with sales increases every year since organization.

In 1929, owing to lower cement prices, there was a slight decline in net income. Net earnings last year were $4,950,400, compared with $5,149,400 in 1928. Per-share earnings on the common were $7.88 in 1929, compared with $7.90 in the preceding year and $6.90 in 1927. Foreign subsidiaries have contributed substantially to the net earnings in the past two years and expansion of the foreign properties is continuing.

For the first nine months of 1930 net income showed a slight decrease from the same period in 1929, totaling $3,446,759, compared with $3,527,784. Per-share earnings in the first three quarters of the current year were $5.45 on the capital stock.

Financial position is strong. Net working capital at the end of 1929 totaled $8,210,000. Approximately $2,000,000 in cash and marketable securities were held and $2,581,200 in receivables. Book value of the capital stock is $56 a share.

The funded debt totals $17,995,000. There is no preferred stock. Common stock outstanding consists of 633,452 shares of no-par value. Dividends are being paid at the rate of $4 per annum.

The price range on the common stock for the last four years is as follows:

	High	Low	Earned Per Share
1927.....	66½	45¼	$6.90
1928.....	94⅞	56	7.90
1929.....	102¾	48	7.88
1930.....	75⅜	50	...

CURRENT DIVIDENDS

Company	Class of Stock	Dividend Rate	Holders of Record	Payable
Alpha Portland Cement	Preferred	1¾% qr.	Dec. 1	Dec. 15
American Aggregates	Preferred	1¾% qr.	Dec. 20	Jan. 2
Boston Sand and Gravel	Preferred	$0.87½ qr.	Dec. 22	Jan. 2
Boston Sand and Gravel	Common	$0.40 qr.	Dec. 22	Jan. 2
Calaveras Cement	7% Pfd.	1¾% qr.	Dec. 30	Jan. 15
Canada Cement	Preferred	1⅝% qr.	Nov. 28	Dec. 30
Cleveland Builders Supply	Common	$0.50 qr.	Dec. 15	Jan. 2
Consolidated Okla. Sand and Gravel	Preferred	1¾% qr.	Dec. 27	Jan. 2
Consumers Co	Pr. Pfd.	$1.50 qr.	Dec. 15	Jan. 2
Coronet Phosphate Co		$2.00 qr.	Dec. 14	Jan. 2
Dolese and Shepard		$2.00 qr.	Dec. 20	Jan. 2
Dufferin Pav. and Crushed Stone	7% Pfd.	1¾% qr.	Dec. 17	Jan. 2
General Asphalt	Common	$0.75 qr.	Dec. 1	Dec. 15
Giant Portland Cement	Preferred	$1.75 S.A.	Dec. 5	Dec. 15
Gypsum, Lime & Alabastine of Canada, Ltd.	Common	$0.20 qr.	Dec. 24	Jan. 2
Ideal Cement Co	Common	$1.75 qr.	Dec. 13	Jan. 2
Illinois Brick		$0.60 qr.	Jan. 2	Jan. 15
International Cement	Common	$1.00 qr.	Dec. 11	Dec. 30
International Salt	Common	$0.75 qr.	Dec. 15	Jan. 2
Johns Manville	Preferred	$1.75 qr.	Dec. 11	Jan. 2
Johns Manville	Common	$0.75 qr.	Dec. 25	Jan. 15
Kelley Island Lime & Transport	Common	$0.62½ qr.	Dec. 20	Jan. 2
Kentucky Rock Asphalt	Common	$0.40 qr.	Dec. 15	Jan. 2
Lawrence Portland Cement		1% qr.	Nov. 31	Dec. 15
Medusa Portland Cement	Preferred	1½% qr.	Dec. 24	Jan. 2
Medusa Portland Cement	Common	$1.50 qr.	Dec. 24	Jan. 2
Metropolitan Paving Brick	Preferred	$1.75 qr.	Dec. 15	Jan. 2
Newaygo Portland Cement	Preferred	$1.75 qr.	Dec. 26	Dec. 30
New York Trap Rock	Preferred	$1.75 qr.	Dec. 20	Jan. 2
Peerless Cement	Preferred	$1.75 qr.	Dec. 20	Jan. 2
Pennsylvania Salt	Common	$1.25 qr.	Dec. 30	Jan. 15
Raybestos Manhattan	Common	$0.65 qr.	Nov. 30	Dec. 15
Santa Cruz Portland Cement		$1.00 qr.	Dec. 24	Jan. 2
Sterling Salt	Common	$0.50 qr.	Dec. 24	Jan. 2
Superior Portland Cement	Class A	$0.27½M	Dec. 23	Jan. 2
United States Gypsum	Preferred	$1.75 qr.	Dec. 15	Dec. 30
United States Gypsum	Common	$0.40 qr.	Dec. 15	Dec. 30
United States Gypsum	Common	$0.50 extra	Dec. 15	Dec. 30
Warner Co	1st Pfd.	$1.75 qr.	Dec. 15	Jan. 2
Warner Co	2nd Pfd.	$1.75 qr.	Dec. 15	Jan. 2
Warner Co	Common	$0.50 qr.	Dec. 30	Jan. 15
Worcester Salt	7% Pfd.	$1.75 qr.	Dec. 26	Jan. 2

Latest Portland-Cement Statistics

The Portland-cement industry in November, 1930, produced 11,098,000 bbl., shipped 8,784,000 bbl. from the mills, and had in stock at the end of the month 23,011,000 bbl. Production of Portland cement in November, 1930, showed a decrease of 21.0 per cent and shipments a decrease of 21.7 per cent, as compared with November, 1929. Portland-cement stocks at the mills were 26.3 per cent higher than a year ago.

The statistics here presented are compiled from reports for November, received by the Bureau of Mines from all manufacturing plants except two, for which estimates have been included in lieu of actual returns.

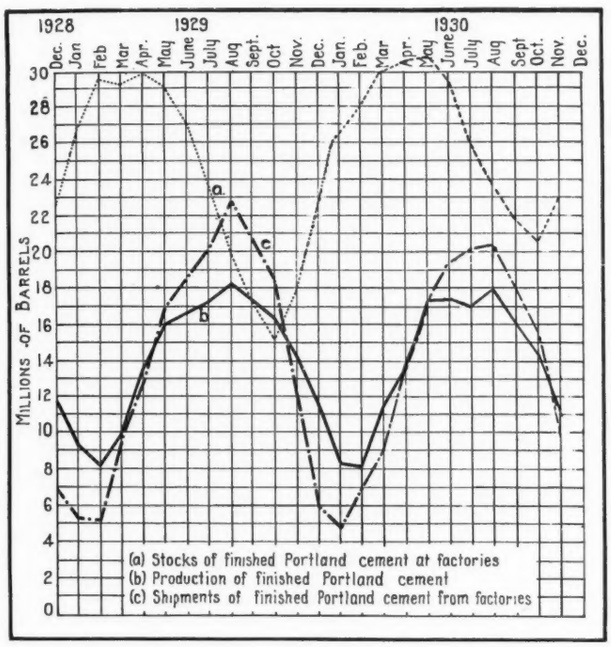

1928
1929
1930
Dec. Jan Feb Mar Apr. May June July Aug Sept. Oct Nov. Dec. Jan. Feb. Mar Apr. May June July Aug Sept Oct. Nov. Dec.
MILLIONS OF BARRELS
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
a
b
c
(a) Stocks of finished Portland cement at factories
(b) Production of finished Portland cement
(c) Shipments of finished Portland cement from factories

Chart showing production, shipments, and stocks on hand of finished Portland cement, by months—December, 1928, to November, 1930.

In the statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants both at the close of November, 1930, and of November, 1929. The estimates include increased capacity due to extensions and improvements during the period.

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN OCTOBER, 1930

Exported to—	Barrels	Value
Canada	3,496	$14,077
Central America	13,233	27,218
Cuba	3,774	10,558
Other West Indies and Bermuda	6,760	10,861
Mexico	6,018	17,810
South America	26,054	90,648
Other Countries	3,355	19,133
Total	62,690	$190,305

DISTRIBUTION OF CEMENT

Shipped to—	September		October	
	1929	1930	1929	1930
Alabama	179,011	68,936	172,980	88,358
Alaska	282	1,362	662	697
Arizona	56,000	39,785	52,544	33,524
Arkansas	206,476	150,714	190,656	144,307
California	915,829	837,669	1,075,308	931,721
Colorado	91,602	82,050	97,352	78,683
Connecticut	206,737	195,962	229,221	153,822
Delaware	34,281	26,704	36,005	20,017
District of Columbia	107,654	137,507	104,051	154,670
Florida	88,730	76,333	106,271	89,354
Georgia	117,262	163,464	124,215	174,340
Hawaii	24,896	16,778	22,716	23,850
Idaho	27,375	46,308	28,709	34,385
Illinois	1,721,624	1,704,696	1,406,895	1,586,016
Indiana	909,295	497,163	686,986	321,285
Iowa	968,958	781,608	716,047	317,288
Kansas	332,819	250,548	336,060	226,472
Kentucky	176,115	241,402	178,287	223,805
Louisiana	171,673	163,544	245,643	172,194
Maine	94,201	148,381	80,564	87,454
Maryland	294,089	285,312	291,625	257,617
Massachusetts	356,318	331,061	365,195	376,533
Michigan	1,601,684	1,018,648	1,161,054	867,458
Minnesota	430,298	374,833	352,958	237,592
Mississippi	107,651	51,680	99,934	39,377
Missouri	748,870	710,759	681,598	713,573
Montana	77,505	44,217	55,468	27,189
Nebraska	224,168	241,572	213,158	174,005
Nevada	14,180	16,111	15,028	18,751
New Hampshire	75,573	84,449	67,001	48,117
New Jersey	825,204	610,200	911,203	664,381
New Mexico	21,621	28,870	28,479	27,047
New York	2,237,801	2,515,171	2,295,014	2,063,858
North Carolina	129,411	102,658	147,399	101,403
North Dakota	49,597	38,358	42,474	24,513
Ohio	1,207,197	1,103,327	1,218,439	1,011,292
Oklahoma	365,927	348,023	376,193	270,430
Oregon	122,669	112,133	114,228	130,953
Pennsylvania	1,632,356	1,557,564	1,550,799	1,351,511
Porto Rico	4,190	10,250	5,195	5,000
Rhode Island	81,919	100,664	78,405	76,031
South Carolina	64,446	245,776	88,492	273,208
South Dakota	83,173	86,654	94,859	44,410
Tennessee	328,182	294,910	330,340	271,922
Texas	697,091	573,392	759,309	438,457
Utah	73,952	39,116	60,619	38,549
Vermont	135,894	66,810	109,422	53,087
Virginia	161,521	174,179	152,804	155,410
Washington	305,056	328,595	240,543	324,276
West Virginia	164,543	196,307	168,957	139,483
Wisconsin	759,187	700,327	597,697	414,797
Wyoming	24,015	20,224	28,708	20,691
Unspecified	52,207	4,888	28,000	40,039
	19,888,315	18,047,952	18,621,769	15,563,202
Foreign countries	61,685	35,048	73,231	35,798
Total shipped from cement plants	19,950,000	18,083,000	18,695,000	15,599,000

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS, IN OCTOBER, 1930

Imported from—	District into which imported	Barrels	Value
Belgium	New York	4,539	$4,238
Canada	Maine and New Hampshire	279	827
	Porto Rico	1,264	1,413
	Vermont	23	60
	Total	1,566	2,300
Denmark	New York	27,034	27,599
	Porto Rico	21,320	26,495
	Total	48,354	54,094
France	Massachusetts	492	1,011
Italy	South Carolina	9	20
Japan	Hawaii	425	445
United Kingdom	New York	1,012	2,380
	Philadelphia	18,887	19,876
	Total	19,899	22,256
	Grand Total	75,284	$84,364

RELATION OF PRODUCTION TO CAPACITY

	November		October 1930 (per cent)	September 1930 (per cent)	August 1930 (per cent)
	1929 (per cent)	1930 (per cent)			
The month	66.6	51.7	65.4	75.7	81.0
The 12 months ended	66.8	62.6	64.2	65.2	65.6

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1929 AND 1930 *(In thousands of barrels)*

Month	Production		Shipments		Stocks at End of Month	
	1929	1930	1929	1930	1929	1930
January	9,881	8,498	5,707	4,955	26,797	27,081
February	8,522	8,162	5,448	7,012	29,870	28,249
March	9,969	11,225	10,113	8,826	29,724	30,648
April	13,750	13,521	13,325	13,340	30,151	30,867
May	16,151	17,249	16,706	17,224	29,624	30,891
June	16,803	17,239	18,949	18,781	27,505	29,364
July	17,315	17,078	20,319	20,153	24,525	26,289
August	18,585	17,821	23,052	20,299	20,056	23,824
September	17,223	16,124	19,950	18,083	17,325	21,889
October	16,731	14,410	18,695	15,599	15,381	20,697
November	14,053	11,098	11,222	8,784	18,213	23,011
December	11,215	.....	5,951	.....	23,538	.....
Totals	170,198	.....	169,437	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY DISTRICTS, IN NOVEMBER, 1929 AND 1930 *(In thousands of barrels)*

District	Production		Stocks at End of Month	
	1929	1930	1929	1930
Eastern Pa., N. J., and Md.	2,821	2,235	891	897
New York and Maine	935	1,029	540	547
Ohio, Western Pa., and W. Va.	1,577	1,263	537	834
Michigan	1,255	917	502	801
Wis., Ill., Ind. and Ky.	1,840	1,337	442	755
Va., Tenn., Ala., Ga., Fla. and La.	1,066	972	593	964
Eastern Mo., Ia., Minn. and S. Dak.	1,260	1,185	430	475
W. Mo., Nebr., Kan., Okla. and Ark.	1,147	885	184	446
Texas	731	498	372	331
Colo., Mont., Utah, Wyo. and Idaho	116	29	270	314
California	1,088	1,002	945	1,185
Oreg. and Wash.	251	379	428	306
Totals	14,087	11,731	6,134	7,855

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN NOVEMBER, 1929 AND 1930, AND STOCKS IN OCTOBER, 1930 *(In thousands of barrels)*

District	November						Stocks at End of October
	Production		Shipments		Stocks at End of Month		
	1929	1930	1929	1930	1929	1930	1930
Eastern Pa., N. J., and Md.	2,973	2,390	2,949	2,124	4,020	4,521	4,255
New York and Maine	848	924	738	617	1,107	1,395	1,088
Ohio, Western Pa., and W. Va.	1,537	1,085	1,197	830	2,580	3,285	3,030
Michigan	1,228	943	667	538	1,636	2,722	2,317
Wis., Ill., Ind. and Ky.	1,760	1,233	1,219	857	1,869	2,922	2,546
Va., Tenn., Ala., Ga., Fla. and La.	1,085	877	1,025	807	1,557	1,767	1,697
Eastern Mo., Ia., Minn. and S. Dak.	1,344	1,131	742	739	1,876	1,934	1,542
W. Mo., Nebr., Kan., Okla. and Ark.	1,176	743	788	632	1,009	1,763	1,652
Texas	661	502	523	453	670	770	721
Colo., Mont., Utah, Wyo. and Idaho	120	40	119	118	453	336	414
California	1,091	817	1,038	728	991	1,052	963
Oreg. and Wash.	230	413	217	341	445	544	472
Totals	14,053	11,098	11,222	8,784	18,213	23,011	20,697

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1929 AND 1930

Month	Exports				Imports			
	1929		1930		1929		1930	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	78,639	$ 283,002	82,387	$ 293,135	151,302	$ 177,976	201,609	$ 207,461
February	58,886	225,590	64,267	217,798	118,930	123,123	114,455	119,717
March	69,079	235,164	117,563	357,896	131,909	112,788	43,622	59,981
April	64,145	218,316	57,419	200,217	89,668	114,281	140,871	178,226
May	57,955	219,366	57,423	198,170	200,646	267,854	94,696	111,998
June	96,055	287,612	82,077	223,639	203,545	228,170	55,356	74,370
July	71,992	247,177	47,082	166,577	182,098	199,960	12,404	20,973
August	60,013	225,762	49,031	167,579	183,938	199,403	35,323	39,029
September	86,268	308,631	46,594	153,384	112,372	152,239	51,096	59,721
October	101,359	337,839	62,690	190,305	172,566	187,504	75,284	84,364
November	53,378	198,197	.....	.....	96,568	95,844	.....	.....
December	88,403	297,255	.....	.....	84,358	79,098	.....	.....
Totals	886,172	$3,083,911	.....	.....	1,727,900	$1,938,240	.....	.....

Cigarette-Lighter Fad Opens Up Sand Market

The demand for monazite sand in the United States is limited to the incandescent gas mantle and the pyrophoric-alloy industries, according to the United States Bureau of Mines, Department of Commerce. Requirements for the manufacture of gas mantles, however, have declined rapidly in recent years, while those for the manufacture of "flints" or sparking metal have increased considerably due to the increased use and popularity of automatic cigar and cigarette lighters.

Despite the attempted monopoly of the manufacture of thorium nitrate by German and Austrian firms, France and the United States for some time previous to the outbreak of the World War had been manufacturing this product chiefly from Brazilian and American monazite. As a result of the war and the serious shortage of thorium nitrate caused by the stoppage of shipments from Germany, other countries took up the manufacture of this product, requiring exceptionally large quantities of monazite sand.

The price of monazite sand has fluctuated considerably since the war, in most cases reflecting the declining use of this mineral. During the war the price of monazite sand delivered to New York, exclusive of the duty of $80 a ton, varied from $25 to $40 per unit (1 per cent per short ton) of thoria, or from $150 to $240 per ton. Immediately after the war the price was quoted (November, 1919) at $27 per unit, or about $162 per ton of the 6 per cent (thoria) sand, plus duty.

Before the end of 1925 the price had dropped to $120 per ton (6 per cent ThO_2). After increasing slightly during the latter part of 1928 to $130 per ton, the price fell to $60 a ton during the late fall of 1929, the lowest figure so far recorded in the history of the industry.

Raybestos-Manhattan to Expand Its Activities

Raybestos-Manhattan, Inc., has negotiated a contract that will necessitate an immediate expansion of activity at the Charleston, S. C., plant and which will provide employment for several hundred additional men throughout the coming year.

The company's other units are enjoying increased sales and, as a result of economies which have been effected in various directions, production costs have been reduced.

The U. S. Asbestos division is fully booked to the end of the current year with good prospects of being able to maintain relatively large operations well into 1931.

Traffic News and Comment

Recent I. C. C. Decisions

Crushed Stone

The Interstate Commerce Commission has found that the rates on crushed stone and agricultural limestone from Lehigh, Ill., to points in northern Indiana and southwestern Michigan were unduly prejudicial to the complainant and unduly preferential of producers of crushed stone at McCook and Bellwood, Ill., and of sand, gravel and crushed stone at Joliet and Plainfield, Ill., Lake Cicott, Kenneth, Monon, Burr Oak, Hibbard, Rochester, Peru, Milford, Milford Junction, Leeland, Whartons, Rupel, Ginger Hill, Huntington, Wolcottville, Elkhart and Winona Lake, Ind. Rates for the future were ordered which the commission said would remove the undue prejudice. While the destination territory is divided into four groups and different methods are used for figuring rates to the various groups, it may be said that, in general, they follow the single-line Kickapoo scale. I. C. C. Docket No. 21,894. Lehigh Stone Co. v. B. & O. et al.

Size of Car Ordered

While the commodity in this case is crushed marble, the principle established can be applied to many other commodities. A car of 60,000-lb. capacity was ordered by the shipper. A car with a marked capacity of 100,000 lb. was furnished and was loaded with 60,500 lb. of crushed marble. The minimum weight as shown in the tariff was, "90 per cent of the marked capacity of the car ordered." Charges on the shipment for the distance it moved under this tariff were collected on the basis of a minimum weight of 90 per cent of the marked capacity of the car used. The Commission found unreasonable the failure of the Louisville & Nashville to provide a tariff rule to the effect that when a car of the capacity of dimensions ordered by a shipper, provided for in the tariff, could not be furnished within a reasonable time and for its own convenience a larger car was furnished, such larger car should be used upon the basis of the minimum weight applicable to the car ordered, but in no case upon the basis of less than the actual weight, provided the shipment could have been loaded upon or in a car of the size ordered. Reparation was awarded on the basis of the capacity of the car ordered. I. C. C. Docket No. 22,704. M. R. Walker v. C. C. C. & St. L. et al.

New Complaints Filed

Cement

Rates and charges in violation of sections 1, 4 and 6 of the Interstate Commerce Act, on cement, from Richard City, Tenn., to Yulee, Fla., are alleged, and complainant asks for a cease-and-desist order and reparation, in I. C. C. Docket No. 24,042. Pennsylvania Dixie Cement Corp., Chattanooga, Tenn. v. N. C. & St. L. et al.

Rate Committee Dockets

NEW ENGLAND ASSN.

Cement

Carriers are proposing to increase combination rates through the cancellation of the application of I. C. C., U. S. No. 1, insofar as it applies to cement. They claim that there is no necessity for continuance of the arrangements and that this action has been taken by the Trunk Line Assn., and the Central Freight Assn. Docket No. 574-4.

Feldspar

Shippers are proposing reductions in the rates on ground feldspar from Keene, N. H. The rate to Bridgeton is 25 cents, proposed, 22½ cents; and to Vineland, N. J., is 32 cents, proposed 22½ cents. Docket No. 21,331.

TRUNK LINE ASSN.

Cement

Increase to provide rates on a comparable basis of rates from other cement-producing points are proposed by carriers on cement, c. l. min. wt. 50,000 lb. from Buffalo, N. Y., Bessemer, Kenney Yard, Crescentdale, Wampum, New Castle, Walford, West Winfield and Neville Island, Pa., to points on the Elk River Branch of the W. M. Ry. Docket No. 25,271.

Carriers propose to establish rates on cement, carloads, from all producing points in Trunk Line territory to Chaffee branch of the W. M., on basis of flat 114 per cent of 12,710 scale. Docket No. 25,314.

Crushed Stone (Coated)

Carriers are proposing to increase the rates on crushed stone coated with oil, tar or asphaltum, c. l. min. wt. 90 per cent of capacity of car, from Akron and LeRoy, N. Y., groups to destinations in northwestern New York, new rates to be on basis of rates applicable from Buffalo, N. Y. Statement of proposed rates furnished on request. Docket No. M-1,579.

Lime

Shippers at Bellefonte and Pleasant Gap, Pa., are asking for reduced rates on lime to Carolina, W. Va., which are fairly comparable with rates to Elkins, Parsons and Durbin, W. Va. The present rate is 25½ cents, and proposed rates are, on building lime, c. l. min. wt. 30,000 lb., 17 cents; on agricultural and land lime, c. l. min. wt. 30,000 lb., 15 cents; on chemical, gas and glass lime, c. l. min. wt. 30,000 lb., 16½ cents; and on ground limestone, c. l. min. wt. 50,000 lb., 13 cents—rates in cents per 100 lb. Docket No. 25,398.

CENTRAL FREIGHT ASSN.

Dolomite

Carrier proposes to establish on dolomite (burnt or roasted) c. l. min. wt., from Narlo, O., to Detroit, Mich., rate of $1.70 per net ton.[1] Present rate $1.80 per ton. Docket No. 26,918.

Ground Limestone

Shippers are asking for a rate of $2 per net ton, on ground or pulverized limestone and limestone dust, c. l. min. wt. 50,000 lb., from Greencastle, Ind., to Dayton, O. The present rate is 18 cents (6th class). Docket No. 26,911.

Sand and Gravel

Shippers are asking for commodity rates on sand and gravel, c. l. min. wt., from Milwaukee, Wis., to Dayton, O., rate of $2.90; to New Salisbury (R. R. Name Corydon Jct.), Ind., $2.65; and to Paris, Ill., $2.30 per net ton.[1] Class rates now apply. Docket No. 26,945.

ILLINOIS FREIGHT ASSN.

Sand and Gravel

A reduction in the rate on sand and gravel from Joliet, Ill., and points taking same rates to Chapin, Ill., to $1.27 per net ton, c. l. min. wt. capacity of car, is proposed in Docket No. 5,974. Present rate, $1.39.

SOUTHERN FREIGHT ASSN.

Crushed Stone

It is proposed to revise the rates on crushed stone, c. l. min. wt., from Harpers Siding, Va., to N. & W. stations, Saltville and Abingdon Branches on basis of I. C. C. Docket 15,216 scale.[1] Docket No. 52,974.

Revision of rates is proposed on crushed stone, c. l. min. wt.[1] from Mascot and Strawberry Plains, Tenn., to N. & W. stations in Virginia on basis of I. C. C. Docket 15,216 scale. Docket No. 52,975.

Commodity rates are proposed on crushed stone, c. l. min. wt.[1], from Big Stone Gap, Glenita and Harpers Siding, Va., to N. & W. Pocahontas and Radford Divisions, stations on basis of I. C. C. Docket 15,216 scale. Docket No. 52,992.

Lime

Reductions in the rates on lime to conform with I. & S. 2874 scale are asked by shippers at Knoxville, River Front Extension and South Knoxville Extension, Tenn., on shipments to Plasterco and Saltville, Va., on c. l. min. wt. of 30,000 lb. The present rate is $3.80 and the proposed rate $2.80. On c. l., min. wt. of 50,000 lb., the present rate is $2.56 and the proposed

rate $2.24 per net ton. Docket No. 53,044.

Limestone

It is proposed to add Jefferson City, Tenn., as an origin to Sou. Ry. Tariff, I. C. C. No. A-10, 166, which contains scale rates applicable on limestone from various producing points to Southern Freight Assn. Territory. Docket No. 52,906.

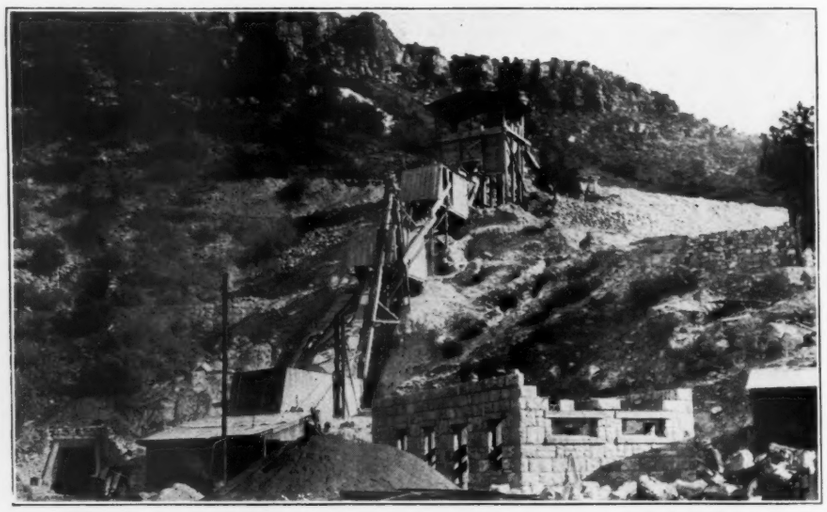
Carriers propose to publish rates to Chardon, O., the same as currently in effect to Ashtabula, O., on stone, marble, calcite, limestone, slate or whitestone from Whitestone and Tate, Ga., Brownson and Gantt's Quarry, Ala., Mineral Bluff, Fairmount and Bolivar, Ga., Kinsey, N. C., Tellico Plains, Louisville, Marmor, Pinkmar, Kingsley, Pickford and Knoxville, Tenn. Docket No. 52,966.

SOUTHWESTERN BUREAU

Limestone

The carriers propose to reduce the rates on lime rock or limestone shovels into dump cars. Scenes depict (broken crushed or ground) from Mosher and Ste. Genevieve, Mo., to points in Illinois. The commodity descriptions to points on the I. C., B. & O., C. B. & Q., and M. & O. to read, "agricultural limestone, min. wt. 90 per cent of marked capacity of car but not less than 40,000 lb." The Interstate Commerce Commission in Docket 21,939 ordered that certain rates be published on agricultural limestone from Bonne Terre, Mo., and group to points in Southern Illinois. The rates from Mosher and Ste. Genevieve, Mo., are higher than the rates in effect from Flat River and Bonne Terre. The proposed rates are necessary in order to clarify fourth section violations. Statement of proposed rates furnished on request. Docket No. 21,703.

[1] The proposed carload minimum weight will be 90 per cent of the marked capacity of the car except, when car is loaded to full cubical or visible capacity, actual weight will apply.



An Arizona asbestos mining and dressing plant.

Motion Picture Depicts Production of Asbestos

The mining, preparation and uses of asbestos are visualized in a one-reel educational motion-picture film entitled "Asbestos, the Magic Fibre," prepared by the U. S. Bureau of Mines, Dept. of Commerce, in coöperation with a commercial concern.

Asbestos is a silky, fibrous mineral found in seams or veins in metamorphic rocks. A close-up shows how the fibres of a piece of asbestos may be readily separated by hand. Asbestos fibre does not rot, resists corrosion, and will not burn.

The principal sources of asbestos on this continent are the mountains of Arizona and the area surrounding Asbestos, Canada. A succession of scenes shows the process of open-pit mining at Asbestos. The rock is blasted and carefully combed by hand for the longest and finest fibres. The remaining rock is loaded by steam the breaking of the large boulders for the crusher by air drills, the drying of the crushed rock in rotary kiln dryers and the screening of the sand and rock from the fibre. Rollers weighing 6,000 lb. crush the larger pieces to silken fibre.

The scene shifts to the factory, where 20,000,000 lb. of bagged fibre are shown in storage. The crushing of this fibre preparatory to the making of asbestos textiles is next depicted.

Textiles are made by first carding and spinning asbestos fibre into thread ready for the looms. The process of running the fibre through the carding machines is pictured. The operation of the roving machines in which asbestos yarn is made is depicted and then the making of thread for weaving from the yarn. Next is shown the looms weaving asbestos cloth for many uses.

The making of various useful products from asbestos cloth is next depicted. These scenes show the making of automobile brake linings, asbestos tubing for making packings, fireproof roofing and packing and gaskets for steam engines, air brakes and automobiles.

Next a series of views show the pulping of fibre for the manufacture of asbestos paper and the pressing of condensed pulp into the form of paper. The making of pipe covering from the asbestos paper is visualized.

Other scenes show the combining of asbestos with magnesia for the making of insulating materials, and the combining of asbestos and cement for the forming of a permanent fireproof material of many uses. The final scenes show the making of asbestos shingles.

Copies of this film are available for exhibition. Applications should be addressed to the U. S. Bureau of Mines, Pittsburgh Experiment Station, Pittsburgh, Pa. No charge is made for the use of the film, but the exhibitor is asked to pay transportation charges.

Crushed-Stone Program

(*Continued from Page 65*)

11:20—How to win an argument—Professors Alvin C. Busse and E. E. Nyberg, New York University.
12:05—Report of Auditing Committee.
12:10—Report of Finance Committee.
12:20—General Business.

Luncheon

1:00 P. M.—Luncheon will be served on the mezzanine floor for executives, superintendents and operating men and others wishing to avail themselves of the opportunity of conferring with manufacturers of machinery, equipment and supplies. The program for Tuesday afternoon has been especially arranged to give all operating men a good opportunity to view in detail the Manufacturers' Division Exposition.

Afternoon Sessions

Cost Accountants

L. R. Cartwright, Mid-West Rock Products Corp., Indianapolis, Ind., presiding
1:15—Luncheon.
2:00—Discussion of proposed uniform cost-accounting manual—Led by J. R. Thoenen, U. S. Bureau of Mines.

Sales Problems

P. B. Reinhold, Reinhold and Co., Pittsburg, Pa., presiding
1:15—Luncheon.
2:00—Popularizing an industry — Robert J. Kratky, attorney-at-law, St. Louis, Mo.
2:40—Development and carrying out of a sales program through central office control—E. T. Nettleton, sales manager, The Connecticut Quarries Co., Inc., New Haven, Conn.
3:00—The management of credit in the stone industry — Wm. E. Hilliard, gen. mgr., The New Haven Trap Rock Co., New Haven, Conn.
3:25—What can a local trade association do to ethically promote sales?—Col. E. J. McMahon, executive secretary, St. Louis Quarrymen's Assn., St. Louis, Mo.

WEDNESDAY, JANUARY 21

Morning Session

W. R. Sanborn, Lehigh Stone Co., Kankakee, Ill., presiding
10:00—Ready-mixed concrete — H. F. Thomson, vice-president, National Ready Mixed Concrete Assn., General Materials Corp., St. Louis, Mo.
10:25—Researches in the durability of concrete — Harry Gonnerman, manager, research laboratory, Portland Cement Assn., Chicago, Ill.
10:40—Researches of the National Crushed Stone Association—A. T.

Goldbeck, director, bureau of engineering, Nat'l Crushed Stone Assn.

11:00—Discussion of two preceding papers.

11:10—Responsibility of the aggregate producer as viewed by the engineer — E. R. Kinsey, president, Board of Public Service, St. Louis, Mo.

11:30—What factors control the service value of ballast?—J. V. Neubert, chief engineer, maintenance of way, New York Central Railroad Co.

11:45—Discussion — Report of committee on ballast—H. E. Bair, chairman.

11:55—Report of committee on uniform cost accounting—L. R. Cartwright, Mid-West Rock Products Corp., Indianapolis, Ind., chairman.

12:15—Report of committee on resolutions.

12:25—Report of committee on constitution and by-laws.

12:30—Report of the nominating committee and election of officers.

12:45—Greeting of president-elect.

1:00—Adjournment.

Afternoon Session

General session for everyone, but arranged especially for operating men, superintendents and manufacturers. Wm. M. Andrews, Lake Erie Limestone Co., Youngstown, O., presiding

1:15—Luncheon.

2:00—Crusher bearings — Their troubles and remedies—L. D. Staplin, Carbonite Metal Co., Ltd., Chicago, Ill.

2:40—The prevention of segregation and breakage in bins — Major Henry Adams, Plainfield, N. J.

3:10—The use of electricity in the handling of stone—J. E. Borland, engineer, Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

4:00—Report of committee on accident prevention—A. L. Worthen, chairman.

4:20—Presentation of National Crushed Stone Assn. safety trophy—W. W. Adams, U. S. Bureau of Mines, Washington, D. C.

Annual Banquet

Ball Room—Hotel Jefferson—7:30 P. M.

Toastmaster—Otho M. Graves, The General Crushed Stone Co., Easton, Pa.

Count Anton Carlson, president of the Swedish-Norway Crushed Stone Assn.

Civics for the Civilized—John B. Kennedy, associate editor, Collier's Weekly.

THURSDAY, JANUARY 22

Morning Session

W. F. Wise, president, presiding

10:00—The control of accidents — T. J. Quigley, chief, mines and quarries section, Dept. of Labor and Industry, Pennsylvania.

10:30—The secondary road problem — Chas. M. Upham, engineer-director, American Road Builders' Assn.

11:00—Mental self discipline aids in industry—Dr. H. S. Hulbert, psychiatrist, Chicago, Ill.

11:45—General business.

12:00—Installation of officers.

Blasting Methods Employed at the Superior Cement Quarry

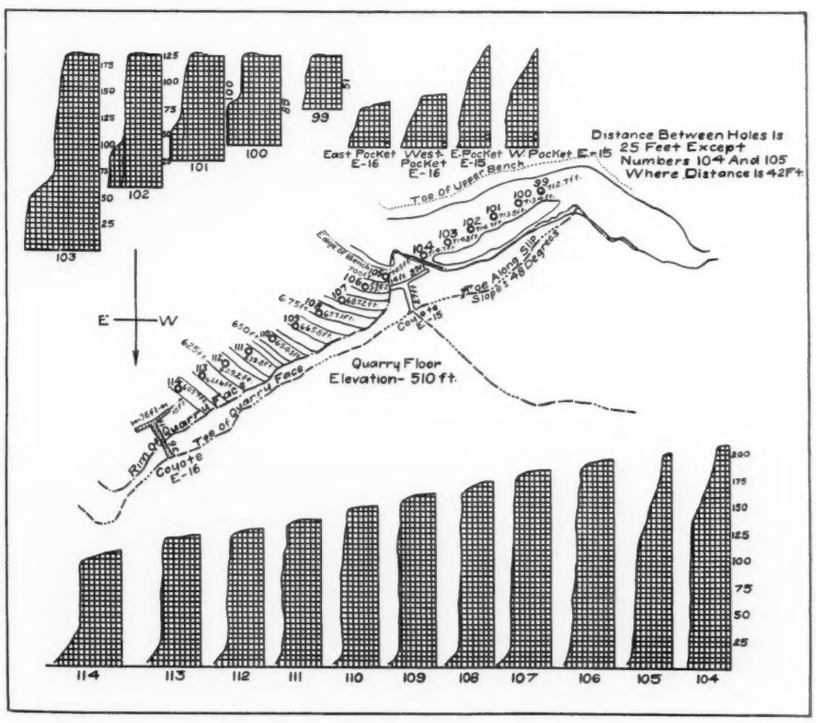
THE accompanying drawing illustrates one of the practices of the engineering department of Superior Portland Cement, Inc., at Concrete, Wash. It exemplifies the preparations that are made for every big shot in the limestone quarry. A description of this quarry and the blasting practice was published in PIT AND QUARRY, April 23, 1930.

The quarry face, which has a maximum height of more than 400 ft., is carried as two benches of approximately equal height. The blast holes are sunk with an Armstrong electric well drill, using an 8-in. bit, and are spaced uniformly at 25 ft. except for particular reasons. In the case illustrated—a shot fired recently in the lower bench—an exception to this 25-ft. spacing was made between holes 104 and 105 where, because of coyote hole E-15, the interval was purposely made 42 ft. Another coyote hole, E-16, was fired at the northeast end of the line of drill holes.

The various cross-sections in the drawing show the burdens for the respective holes, the distance between lines representing 5 ft. These burdens are computed in cubic yards as shown in the accompanying table.

The volume of rock for coyote hole E-15 is distributed in the table to the adjacent holes 104 and 105. The burden on coyote hole E-16 amounted to 3,208 cu. yd. This quantity added to the gross quantity shown in the table gives the total volume of rock for this entire shot as 93,087 cu. yd., equivalent to 209,450 tons. In E-15, 1,800 lb. of 40-per cent. gelatine dynamite was used and in E-16, 2,250 lb. The total amount of dynamite used in the entire blast was, therefore, 45,070 lb. This means that approximately 4 2/3 tons of rock was dislodged per pound of dynamite.

Hole No.	Cu. Yd.	DuPont 75%	DuPont 60%	DuPont 40%	Total Lb. Explosives
99	1,747	270	180	....	450
100	3,935	900	360	200	1,460
101	5,556	1,125	450	....	1,575
102	6,468	1,125	450	600	2,175
103	10,389	1,080	1,350	650	3,080
104	7,858	....	2,070	1,600	3,170
105	7,669	....	1,350	2,100	3,450
106	7,296	....	1,350	2,500	3,850
107	5,995	....	1,575	2,350	3,925
108	5,671	....	1,575	2,000	3,575
109	5,315	....	1,575	1,050	2,625
110	4,862	....	1,395	1,250	2,645
111	4,472	....	1,350	1,200	2,550
112	3,972	....	1,575	750	2,325
113	4,007	....	1,350	600	1,950
114	4,667	....	1,215	500	1,750
	89,879	4,500	19,170	17,350	41,020



Plan of quarry face, and cross-sections of burdens on blast holes and coyote holes.

Water stood in the holes to a depth of 50 to 60 ft. For this reason, gelatine dynamite was loaded in the holes to above water-level and then the holes were filled to within 25 to 35 ft. of the tops with Red Cross dynamite. The balance of each hole was filled with dirt tamping. The gelatine cartridges were 7 in. by 24 in. in size, the Red Cross cartridges, 7 in. by 16 in. Until each hole was loaded to water level the cartridges were lowered carefully but thereafter they were dropped to place.

All detonation was with Cordeau-Bickford fuse, one line in each hole, all lines connected with a main line which also served the two coyote holes. The fuse was detonated by a No. 8 cap; this, in turn, being fired from a 600-volt power line.

A good break resulted and the long toes in front of some of the holes were pulled successfully.

Review of Foreign Practice

Urges an International Congress of Cement Men

International congresses have been held for the furthering of almost all sciences and industries and, recently at Liege, there was held the First Congress of Concrete and Reinforced Concrete, but there has not yet been held an International Cement Congress. The Spanish journal *Cemento* (Barcelona) believes that such a congress, the idea of which is admittedly not new, would be of much utility and that many interesting problems relating to this comparatively new industry could be profitably handled.

One question which should be treated in all detail is that of nomenclature, and at least the determination of a standard Portland cement; also the required tests for this product. There is at present a great diversity of requirements in the different countries: strengths considered adequate in one will not suffice in another and percentages of certain components will be allowed and even favored in one country that are not tolerated in others.

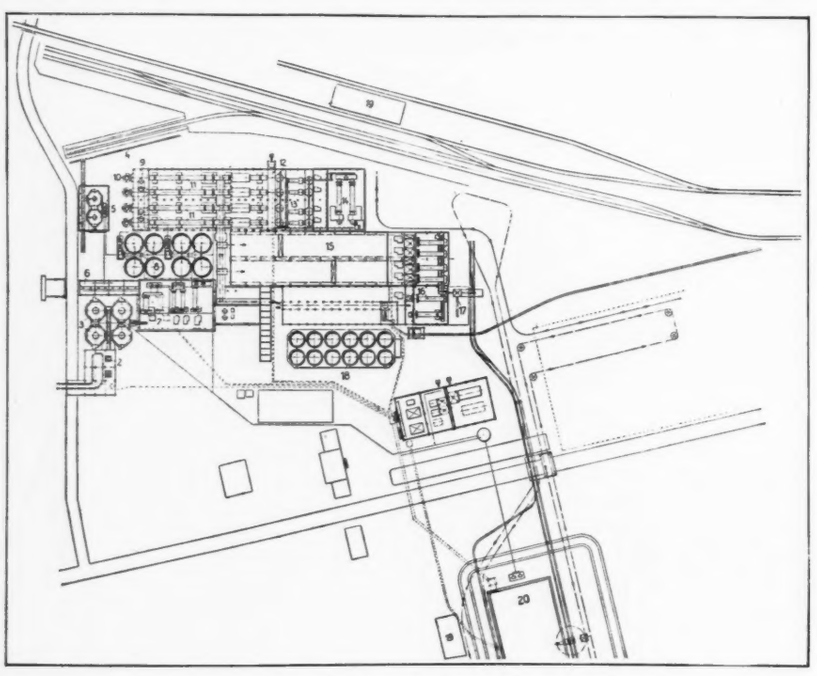
The question of MgO alone would be a highly important one to discuss. Until recently almost all specifications limited the MgO content to 3 per cent, some because of conviction and some because of pure imitation. After some interesting investigations it has been established that even greater percentages are not injurious in cement, and most countries have raised the tolerance to 5 per cent, with very important results in countries such as Italy where it is now possible to utilize deposits hitherto unavailable. Many national specifications have recently been revised in England, France, Italy and Spain and Switzerland, Germany and the United States are revising theirs, so that any discussion of internationalizing the specifications would be of special value. Another subject to consider would be an international source of statistics on the cement industry.

Where would such a congress be held? Different countries have good claims, based on different grounds—in quantity of production and in research on applications, the United States; in research on cement itself, undoubtedly Germany; England and France are the countries of Aspdin, inventor of Portland cement, and of Vicat and Bied, respectively; and Portland, from which the cement is named, is in England. This question is one that would have to be settled at a later stage.—*Cemento* 2:577-9, Nov., 1930.

New Cement Mill Begins Production in France

A large new cement plant has recently been put in operation by the Societe des Ciments Portland Artificiels du Cambresis near Marcoing, six kilometers from Cambrai in the north of France. Marcoing is at an intersection of several principal railway lines, the most important being the line from Paris to Cambrai, and is on an important freight canal. The raw materials are limestone, chalk and clay.

The construction and operation of the plant are shown by the reference numbers on the diagram: 1—arrival of chalk from the quarry, 2—crushers, 3—four chalk washers, 4—clay storage, 5—two clay washers, 6—clay-slip silos, 7—slurry mixers, 8—slurry tanks, 9—kiln feeds, 10—stacks, 11—four rotary kilns each with a capacity of 225 tons, 12—pulverized coal firing, 13—coal mills, 14—coal driers, 15—clinker storage with traveling cranes and clamshells, 16—six clinker mills, 18—twelve cement silos of 1,000 tons each, 19—bagging plants for railroad and dock loading, 20—dock.—*Revue des Materiaux de Construction* No. 252, pp. 355-358, Sept., 1930.



Plan of new plant of Ciments Portland Artificiels du Cambresis.

Development of Poliet et Chausson Cement Co.

The trend toward consolidation inside the cement industry which has been going on in many of the large cement-producing companies in recent years, has led in France to formation of some very large companies, and chief among them the Poliet et Chausson firm. This company recently acquired, outright, nine additional companies into its organization.

According to Charles Jaeger, writing in *Zement*, the Etablissements Poliet et Chausson were founded in 1901. The company, at that time, had a lime-and-gypsum factory with an annual output not over 100,000 tons, and a capital of 850,000 francs. Today, it has a capitalization of 100,000,000 francs; its production in 1928 was 1,100,000 tons, in 1929 1,400,000 tons, and the 1930 output will probably be around 2,000,000 tons.

Half of this output is Portland cement, including the quick-hardening and high-strength special cement known as "Superciment France" which it has been making since 1924. Nine of the Poliet et Chausson plants are engaged in the manufacture of this product: Gargenville, Beaumont (Seine-et-Oise), Samer, Camiers (Pas-de-Calais), Cantin (Nord), Pagny-sur-Meuse (Meuse), Grande-Paroisse (Seine-et-Marne), Beffes (Cher), and Lormont (Gironde).

Eight plants are engaged in the production of lime and eleven in the production of gypsum. The company has, furthermore, a concrete-block plant at Paris-Oise (Seine) and four ceramic factories.

The Poliet et Chausson company has 37 factories. By far the most important of these is that at Gargenville which was put in operation in 1919 and, today, has an annual capacity of 300,000 tons. Next in size is the plant at Cantin, which has three kilns and a yearly production of about 200,000 tons. The plant at Pagny-sur-Meuse was recently thoroughly modernized, increasing its capacity to 150,000 tons.

Recent Patents

AMERICAN

Crushing

Hammer crusher. George W. Borton, New Lisbon, N. J., assignor to Pennsylvania Crusher Co., New York, N. Y. No. 1,781,891.

Hammer mill. Charles A. Jamison, Philadelphia, Pa., assignor to Pennsylvania Crusher Co., New York, N. Y. No. 1,781,904.

Single-roll crusher. George W. Borton, Philadelphia, Pa., assignor to Pennsylvania Crusher Co., New York, N. Y. No. 1,783,373.

Pulverizer. Gustav H. Kaemmerling, Erie, Pa., assignor to Erie City Iron Works, same place. No. 1,783,717.

Excavating

Mining machine. Louis A. Maxson, Claremont, N. H., assignor to Sullivan Machinery Co., same place. No. 1,781,906.

Excavating machine. Charles B. King, Benjamin Jacoby, and Dwight B. Shelton, Marion, O., assignors to Marion Steam Shovel Co., same place. No. 1,783,293.

Dipper-tooth. James R. Watts, New Castle, Del., assignor to American Manganese Steel Co., Chicago, Ill. No. 1,783,350.

Mining and loading machine. Edmund C. Morgan, Richmond Hill, N. Y. No. 1,783,443.

Excavating, elevating, and loading machine. Harry K. Clemons, St. Paul, Minn. No. 1,783,462.

Excavating machine. Charles C. Hansen, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J. No. 1,783,787.

Excavator scoop. Robert R. Downie, Beaver Falls, Pa., assignor to Keystone Driller Co., same place. No. 1,783,831.

Kilns

Rotary cement-burning kiln. Axel V. Jensen, Copenhagen, Denmark, assignor to F. L. Smidth & Co., New York, N. Y. No. 1,781,845.

Material Handling

Method of producing, transporting, and handling cementitious material. Ota T. & Oakley J. Graham, Richmond, Va. No. 1,783,332.

Miscellaneous

Automatic temperature control in pulverizing mills. Joe Crites and Walter A. Koren, Evanston, Ill., assignors to Raymond Bros. Impact Pulverizer Co., Chicago, Ill. No. 1,783,358.

Mixing

Concrete mixer. Frank D. Robbins, Newberg, Ore. No. 1,781,823.

Concrete mixer and agitator. Charles F. Ball, Milwaukee, Wis., assignor to Chain Belt Co., same place. No. 1, 781,965.

Loading device for concrete mixers. James E. Bushnell, North Plainfield, N. J., assignor to Ransome Concrete Machinery Co., Plainfield, N. J. No. 1,783,532.

Screening

Apparatus for screening, sorting, and handling material. Byron W. Pape, Salt Lake City, Utah. No. 1,781,857.

Vibratory screen. Frederick H. Haselow and Charles Redig, Milwaukee, Wis. No. 1,783,617.

FOREIGN

Blasting

Blasting in mines and quarries. V. Tschenn. British. 338,454.

Blasting process. Curt Bunge. German 512,955.

Cement

Cements, concretes and mortars. J. W. Battersby. British 338,242.

Process and apparatus for use in the manufacture of cement and other pulverulent or granular products. R. Pourbaix. British 338,463.

Process for production of a waterproof cement or lime. Dr. Paul Mecke, German 512,876.

Rotary kiln for production of fused cement. Arno Andreas. German 513,409.

Rotary kiln for fused cement production. Arno Andreas. German 513,582.

Process for burning slurries, particularly cement slurry. Lepol, Internationale Patentverwertungs G. m. b. H. and N. V. "Solopol," Ingenieursbureau tot Exploitatie van het System Polysius. German 513,584.

Coolers

Rotatable drums applicable for use in cooling materials discharged from rotary kilns. Fried. Krupp Grusonwerk Akt.-Ges. British 338,069.

Concrete

Process for producing insulating material of cellular concrete. Torkret-Gesellschaft m. b. H. German 512,936.

Crushing and Grinding

Gyratory crushers. Nordberg Manufacturing Co. British 319,616.

Grinding or crushing apparatus. H. S. Rexworthy. British 337,911.

Crusher. John Waldemar Ericsson. German 512,671.

Feeding device for hammer mills. Henry Gilman Lykken. German 513,253.

Pivoted hammer mill. Paul Legrand. German 513,500.

Tube or trommel mill. Allis-Chalmers Manufacturing Co. German 513,501.

Drilling

Rock drill. Brereton Roberts and Frederick Charles Banwell (John Murray). Canadian 306,412.

Subaquatic rock drilling device. William D. Grant. Canadian 306,467.

Drill steel. The Holman Brothers Ltd. (Hugh Mitchell). Canadian 306,577.

Hammer drill. Ingersoll-Rand Co. German 512,953.

Rock drill. Hans Walser. German 512,954.

Drying

Drying apparatus. J. N. Collins. British 337,899.

Rotary drums for drying purposes. Deutsche Babcock & Wilcox Dampfkessel-Werke Akt.-Ges. and A. W. Kramlowski. British 338,265.

Apparatus for removing gases and vapors from rotary dryers. Bernhard Saegebarth. German 512,708.

Apparatus for drying fine materials by means of hot gases. Aktien-Selskabet Niro. German 512,795.

Device for drying sand. Rudolf Schneider. German 513,264.

Rotary dryer with crushing or grinding device built in. Bernhard Saegebarth. German 513,280.

Rotary dryer equipped with grinding elements. Soc. Anon, pour l'Utilisation des Combustibles. German 513,660.

Excavating

Grab bucket. S. H. Priestman. British 338,225.

Drag scraper. Demag Akt.-Ges. German 513,841.

Firing

Apparatus for use in burning pulverized fuel. Gasified Pulverized Fuel (G. P. F.) Ltd., H. D. Tollemache and O. Margetson. British 338,243.

Pulverized fuel burner systems. A. W. Field. British 338,362.

Gypsum

Producing ammonium sulphate by treatment with gypsum of an ammoniacal solution used for the scrubbing of gases. Union Chimique Belge Soc. Anon. British 338,373.

Treatment of gypsum and alabaster to give it the appearance and hardness of marble. F. J. G. Garner. British 338,465.

Kilns

Rotary kiln feed-control system. Wilfred R. Bendy. Canadian 306,183.

Material-Handling

Aerial ropeway transporters. S. Voss. British 337,876.

Mechanical dischargers for granular and like materials. Pneumatic Conveyance & Extraction (1929) Ltd., W. A. Smith and N. Burgess. British 338,166.

PIT AND QUARRY will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.

Apparatus for lifting and dumping railway cars. F. G. Mitchell. British 338,209.

Belt conveyors. T. G. Nyborg and M. F. Higgins. British 338,289.

Conveyors. T. Hill Engineering Co. (Hull) Ltd., and G. F. Hill. British 338,377.

Conveyors. Rock Springs Loader Co. British 338,467.

Device for spreading material in storage piles. Mix & Genest Akt.-Ges. German 512,940.

Mono-cable device. J. Pohlig Akt.-Ges. German 513,102.

Apparatus for lowering or elevating buck materials. Fritz Witte. German 512,942.

Railway-car dumper. J. Pohlig Akt.-Ges. German 513,103.

Loading device. Firma Arnold Bernstein. German 513,104.

Bin installation. Adolf Bleichert & Co. Akt.-Ges. German 512,781.

Device for unloading bins. Jacob B. Jacobsen. German 513,118.

Bin for bulk materials. Dipl.-Ing. Robert Thome. German 512,994.

Bottom-dumping bucket. Schenck and Liebe-Harkort Akt.-Ges. German 513,447.

Control for shaker-conveyor motor. Flottmann Akt.-Ges. German 513,-837.

Automatic brake for compressed-air operation in connection with a rotary dumper. Schuechtermann & Kremer-Baum Akt.-Ges. fuer Aufbereitung, and Friedrich Dressler. German 513,-585.

Mining

Mining machines. A. Y. Hoy. British 337,790.

Means for supporting roof timbers in mines. J. Wheatley. British 338,005.

Process and means for geological examination for studying and exploring the subsoil. Mines Domaniales de Potasse d'Alsace. British 338,093.

Arches for supporting sides and roofs of headings and tunnels in mines and like places. F. Richards. British 328,451.

Mixing

Mixing and blending systems. The Fuller Co. British 338,123.

Mixing and grinding or crushing machines. G. H. Howse and P. S. Howse. British 338,232.

Mixing apparatus with helical conveyors. Maschinenfabrik Augsburg-Nurnberg Akt.-Ges. British 338,440.

Process and apparatus for mixing fluids and slurries by means of compressed air. A. Borsig G. m. b. H. German 513,340.

Sacking

Multi-wall paper bags. J. D. Rawlins and Paper Sacks, Ltd. British 338,170.

Separating and Screening

Apparatus for sieving, sifting, filtering, drying, measuring and other kindred purposes. W. D. Williams. British 337,803.

BUILDING MATERIAL PRICES, NOVEMBER 1, 1930

Data collected by the Bureau of the Census and prepared by the Division of Building and Housing, U. S. Bureau of Standards.

City	Portland Cement (bbl.)	Gypsum Plaster (tons)	Gypsum Plaster Board (1,000 sq. ft.)	Lime (tons)	Building Sand (cu. yd.)	Crushed Stone (tons)	Roofing Slate (100 sq. ft.)
Akron, O.	$2.67	.....	.....	$18.00	$1.85	$1.85	.....
Albany, N. Y.	2.97	$17.10	$24.75	18.00	.....	.....	.....
Atlanta, Ga.	2.85	18.00	.....	17.50	3.38	3.25	.....
Baltimore, Md.	2.53	14.50	.....	13.00	2.40	2.75	$10.00
Birmingham, Ala.	3.00	17.00	.....	19.00	2.85	2.25	.....
Buffalo, N. Y.	2.95	16.00	21.00	18.00	2.50	2.05	12.00
Chicago, Ill.	2.25	15.00	21.00	17.00	2.00	2.00	.....
Cincinnati, O.	2.96	.....	24.75	16.40	2.63	2.55	.....
Cleveland, O.	2.40	14.50	22.00	12.00	1.95	2.70	16.00
Columbia, S. C.	2.63	14.15	.....	13.50	2.50	2.75	11.00
Columbus, O.	2.70	15.00	.....	14.00	.....	2.25	11.00
Denver, Colo.	3.20	18.00	35.00	22.00	1.25	1.50	.....
Des Moines, Iowa	3.08	.....	.....	20.00	1.10	.....	.....
Detroit, Mich.	2.60	17.60	25.00	14.80	2.23	3.00	.....
Erie, Pa.	2.40	16.00	22.50	19.00	2.25	.....	.....
Fairmont, W. Va.	2.80	18.00	.....	16.00	3.15	3.50	13.00
Grand Forks, N. D.	2.80	16.00	25.00	.....	2.60	.....	.....
Kansas City, Mo.	2.50	15.00	25.00	24.00	1.70	1.88	17.00
Lansing, Mich.	2.90	16.50	.....	14.00	.....	.....	.....
Los Angeles, Cal.	2.30	15.20	.....	22.00	1.85	1.90	.....
Louisville, Ky.	2.52	16.00	.....	15.50	2.20	2.43	18.00
Milwaukee, Wis.	2.25	18.00	25.00	16.00	1.50	1.30	14.00
New Bedford, Mass.	2.60	17.50	27.00	18.50	1.75	3.00	.....
New Haven, Conn.	2.90	.....	.....	20.00	1.25	2.25	.....
New London, Conn.	2.80	18.00	25.00	26.00	1.50	2.40	.....
Paterson, N. J.	2.40	17.50	25.00	18.00	1.50	2.10	14.00
Philadelphia, Pa.	2.30	18.00	.....	15.00	1.80	2.65	10.00
Portland, Ore.	2.60	18.00	30.00	23.00	1.50	.....	.....
Poughkeepsie, N. Y.	2.18	.....	.....	.....	2.25	2.00	.....
Richmond, Va.	3.10	20.00	31.00	17.50	1.95	2.45	13.00
Rochester, N. Y.	3.25	17.00	22.00	20.00	1.75	2.40	12.00
Rockford, Ill.	2.90	16.00	25.00	20.00	1.75	1.15	.....
St. Louis, Mo.	2.15	18.00	.....	18.00	1.35	1.00	13.00
St. Paul, Minn.	2.45	18.00	.....	18.00	2.23	1.75	13.00
Saginaw, Mich.	2.35	17.00	25.00	18.00	2.50	3.25	14.40
San Antonio, Tex.	2.60	19.15	.....	20.00	2.10	2.35	.....
San Francisco, Cal.	2.60	19.90	.....	22.50	1.40	1.60	16.00
Savannah, Ga.	2.25	16.00	25.00	20.00	1.75	.....	.....
Scranton, Pa.	2.80	19.00	.....	20.00	.....	.....	.....
Seattle, Wash.	1.75	20.00	35.00	22.00	1.40	.....	.....
Shreveport, La.	3.20	22.00	.....	.....	2.00	4.75	15.00
Sioux Falls, Ia.	3.00	15.00	.....	24.00	1.25	2.25	.....
Syracuse, N. Y.	3.00	17.00	22.50	18.00	2.00	2.25	12.00
Tampa, Fla.	3.00	22.50	.....	24.00	1.50	3.50	.....
Terre Haute, Ind.	2.85	20.00	28.00	18.00	1.65	3.50	14.50
Toledo, O.	2.60	14.50	20.00	16.00	2.00	2.50	.....
Trenton, N. J.	2.40	17.50	26.00	18.00	1.50	2.10	14.00
Tucson, Ariz.	3.37	17.10	.....	30.00	1.25	2.50	.....
Washington, D. C.	2.55	16.00	25.00	14.00	.....	.....	.....
Waterbury, Conn.	3.00	15.00	30.00	20.00	1.35	2.45	15.00
Youngstown, O.	2.60	15.00	.....	15.00	3.40	2.50	14.00

Separation of dry materials. I. L. Bramwell and Birtley Iron Co., Ltd. British 338,119.

Cleaning device for bar screens. The Dorr Co. (John H. Knowles). Canadian 306,561.

Apparatus for sifting fine or pulverulent material by means of a stream of air or gas. Steitz & Co. G. m. b. H. German 512,672.

Slag

Centrifugal mill for granulating fluid slag. Vereinigte Stahlwerke Akt.-Ges. German 512,779.

Book Reviews

Metallurgists and Chemists' Handbook, compiled by Donald M. Liddell; third edition, revised and enlarged. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York, N. Y. Price, $5.

This valuable reference book made its first appearance during the World War. The present edition attempts to put in convenient form the advances that have been made in metallurgy and chemistry during the post-war years. Although the new book contains about one-third more material than did the original, its form is still small enough to enter one pocket easily. The topics of the twelve main sections are mathematics, price and production statistics, physical constants, chemical data, sampling and analysis, ore dressing, cyanidation, fuels and refractories, mechanical engineering and construction, general metallurgy, organic chemistry, and first aid.

Standards and Specifications for Non-Metallic Minerals and Their Products, National Bureau of Standards of the U. S. Dept. of Commerce; miscellaneous publication No. 110, April, 1930. Obtainable from Supt. of Documents, Washington, D. C., price $2.75.

The contents of this large volume are arranged according to a decimal classification of the many non-metallic minerals of commerce. Most readers of PIT AND QUARRY will find their chief interest in the 510-519 classification which fills 300 pages. Thus 511.7 stands for rock and stone for road-building, 516.11 for Portland cement, and 517.2 for hydrated lime. For each commodity, many data are given, such as standard specifications, sampling and testing, basis of purchase, and inspection. The book is of special value as an authoritative reference.

Legal Information for Operators

Contractor Held Bound by Written Agreement

Considerable discussion has arisen from time to time whether a contractor is bound by an agreement to make a valid contract. Usually, if the parties are fully agreed, there is a binding contract, notwithstanding the fact that a formal contract is to be prepared and signed; but the parties must be fully agreed and must intend the agreement to be binding. If though fully agreed on the terms of their contract, they do not intend to be bound until a formal contract is prepared, there is no contract.

For example, in Agostini v. Consolvo, 153 S. E. 676, a stone company wrote to a general contractor the following letter:

"We will furnish cut ready to set all Indiana limestone required in the erection of the U. S. Post Office Building, Yonkers, N. Y. as per plans and specifications prepared and submitted by the Supervising Architect, Washington, D. C., for the sum of Fifty-Seven Thousand dollars ($57,000) f. o. b. shipping point, freight allowed to Yonkers, N. Y.

"We will also do all hauling, setting, cleaning and pointing of same for the sum of Twenty-Five Thousand dollars ($25,000).

"Yours very truly,
"CONSOLVO & OVERMYER."

Upon receipt of this letter the general contractor replied as follows by letter:

"We hereby accept your estimate dated March 15th amounting to $25,000 to perform the following work according to the plans and specifications in connection with the above named building.

"All the necessary limestone as per plans and specifications will be furnished by us f. o. b. cars Yonkers, N. Y. and all granite stone to be delivered at the building site, you are to do all the hauling of limestone, and the setting, cleaning, pointing and finishing complete all the lime and granite stone work.

"As soon as the contract is awarded to us we will enter into contract with you in a more detailed form, for the prosecution of the work."

A few days later the general contractor wrote to the stone company the following letter:

"We have found the union here 100 per cent strong and they claim that the stone work, just the setting, cannot be sublet unless the subcontractor will perform all the masonry work.

"So according to this ruling it seems that unless you will be interested to also bid on the brick work, we will have to have this work done by the day."

The stone company sued the general contractor for $10,000 damages alleging breach of the contract. The general contractor contended that he was not liable because the formal contract was not signed. Nevertheless the higher Court held the general contractor liable, saying:

"Where the minds of the parties have met, and they are fully agreed, and they intend to be bound, there is a binding contract, even though a formal contract is later to be prepared and signed. . . . It appears that the two letters certainly embraced substantially all of the terms and conditions under which the work was to be done, and that there was nothing left to be done except embody those terms and conditions in a formal contract which was to be prepared by Agostini Bros. (general contractor)."

Must Furnish Statement Showing Work Paid For

It is well settled that contractors should supply owners with a sworn statement of the names of all material men and subcontractors who have been paid, as well as those who have not been paid, otherwise the right to a mechanic's lien may be forfeited.

For illustration, in Frisch v. Ammon, 171 N. E. 247, the higher Court adjudicated the commonplace state law which reads, as follows:

"The original contractor shall . . . make out and give to the owner . . . a statement under oath, showing the name of every laborer in his employ who has not been paid in full and also showing the name of every subcontractor in his employ, and of every person furnishing machinery, material or fuel, and giving the amount, if any, which is due or to become due to them, or any of them, for work done, or material furnished to him."

A general contractor sent a statement to the owner, but failed to include the names of material men who had been paid for the material furnished. In holding the lien invalid, the Court said:

"It is claimed that if the material men were paid it is not necessary to list them. We construe the statute otherwise, and as requiring the listing of all persons furnishing material, whether paid or unpaid at the time of furnishing the statement."

Quarry Owner Liable if Unsafe Tools Are Used

Generally speaking, it is negligence for an employer to furnish a tool which is not reasonably safe to be used by an employee. On the other hand, the law is established that if an employee picks up a hoe, an ax, or a claw bar, or any other simple tool, and if the defects are so open and glaring that a reasonably prudent person would not undertake to use them, then the use of the tool would not be the exercise of ordinary care by the employee for his own protection. Under these latter circumstances the employee is not entitled to damages for an injury sustained.

For illustration, in Nolen v. Halpin-Dwyer Co., 29 S. W. (2d) 215, it was shown that a man named Nolen was employed in a rock quarry. It was his duty to break up the rock into small pieces, and for this work he used a hammer or sledge, the head of which was flat or rounded on one end and shaped like a hatchet on the other. The flat end was used for the purpose of breaking thin strata of rock, but the sharp end was used for splitting stone, which was too thick to be broken otherwise. He was an experienced employee and understood the use of the tool.

A foreman selected a rusty tool and, when Nolen was using it, some rust and steel on the hammer flew up and hit him in the eye, causing severe injury. He sued the quarry owner for damages on the grounds that an employer is expected by the law to supply safe tools. However, the Court held the employer not liable, stating the following important law:

"This failure to use ordinary care is negligence, and if he sues the master for the master's neglect in furnishing an unsafe tool, the master may respond and say the tool was a simple device, and any ordinary person could have seen and known the defects thereof, and in using it in that condition you have been guilty of negligence which contributed to your injury, and you cannot recover."

Liability for Injury in Going to and From Work

As a general rule, an injury suffered by an employee in going to or returning from the employer's premises, where the work of his employment is carried on, does not arise out of and in the course of his employment. On the other hand, it is interesting to know that the relation of employer and employee continues while the employee is riding to and from his employer's premises, in a truck used in connection with his employer's work, by direction of his employer, with his knowledge and acquiescence in the continued practice, which was beneficial to both the employer and employee; and an injury sustained while so riding arises out of and in the course of his employment.

For instance, in Alberta Contracting Corp. v. Santomassimo, 150 Atl. 830, a workman employed in a stone quarry, was injured while traveling from his home to the quarry in a motor-truck used but not owned by his employer. In holding the latter liable, the Court said:

"The undisputed evidence was that the decedent rode to and from his work in the truck by the direction of the 'boss' or foreman and continued to do so with the knowledge and acquiescence of his employer and in accordance with the latter's expectation. It shows that the employer arranged for such transportation of the decedent to and from his work for the benefit of both."

Insurance Problems Discussed

Reviewing 1930 From an Insurance Man's Angle

Nineteen hundred and thirty—What a year!

That about sums up everybody's opinion of the twelve months just closed. It has been a year of painful readjustment to hard work after an artificial period of easy money.

The year has treated the insurance companies just like every other business, except that, in a few ways, things have not been so bad.

Insurance companies have suffered most on the purely financial side. Their assets (bonds and investment stocks) have shrunk, although the shrinkage has been checked by the fact that the finance committees of these companies include mostly experienced and conservative bankers. The effect of the shrinkage has been only to cut profits, for the situation has not been acute enough to threaten the solvency of many.

The loss record for 1930 has been better than might have been expected. In the first place, there has been no major catastrophe—no conflagration or tornado has swept through any city. In the second place, the year has been surprisingly free from "moral hazard." When times are bad, the underwriters always look for an increase in fire among unprofitable businesses. This is called the moral hazard, and includes not only incendiary fires but, even more, the many fires due to carelessness which so often accompanies business stagnation. But, fortunately, the number of fires attributed to poor business is small.

Losses have been bad, however, in the fields of robbery and embezzlement. Until this year one could summarize the public attitude toward robbery insurance about as follows: Property owners in the cities thought the rates were too high and those in the country felt that the less-populated districts were free from danger. All this has changed. Robberies in the cities occur daily, and city gangs are swooping out to hold up pay-rolls two hundred miles from the metropolis in which they live. This has been brought about by the availability of the automobile for both speed and distance, and by the corruption of city police departments. It has been aggravated this winter by the large amount of unemployment. Only a prophet could venture to say when things may get better.

The increase in fidelity losses is saddening, because it means generally that old and trusted employees have lost their judgment and taken money. The immediate reason for taking the firm's money varies from horse racing to family sickness. The erring employee invariably thinks he is just "borrowing" the money and will replace it before he gets caught. It has reached a point where a man's past good record is not a complete guarantee that he will follow the tedious path of scrupulous honesty, and firms are rapidly seeing the present advantage of putting even old employees under bond.

The past year has been distinctly a "buyers' market" in fire insurance, but for different reasons from those that would cause such a situation in industry. The price of insurance should never be marked down on individual items as merchandise may be, because insurance rates are merely a measure of the relative fire hazard of different properties and any arbitrary marking down of one rate would be discriminatory. The causes of this general rate reduction are two. In the first place the insurance companies have recently completed a statistical study which showed that some classes of industry are not, in fact, as hazardous as we had thought them. Reductions of this sort have been greatest in the Middle-west. The second cause is the fact that, during the years of the "bull" stock market, many more insurance companies were formed than are needed. The competition for business is terrific now. It will doubtless end by many of the new corporations being merged with bigger competitors but, temporarily, most people are buying their fire insurance at less than cost.

Contract bonds (surety bonds) are a subject of constant interest. You have to furnish one on every public job and on an increasing number of private jobs. Many producers and contractors look on them as an inevitable graft—an extra that cuts down the net profit. Frequently the man furnishing a bond places it with a broker or company that can return some business favor, whereas he should always choose a bonding company that will be friendly. It is easily possible to have a bond called upon because of a strike or other contingency beyond one's control and that may put a man in the hands of his surety.

There is considerable sentiment among insurance men to reduce the present rates on contract bonds. Two or three minor companies are doing it. The bigger companies are divided in their opinion as to whether the loss experience would justify a lower rate, and it is still too soon to predict the outcome of this agitation. The main subject of discussion is the construction or supply bond which calls for a premium of one and one-half per cent of the contract price and which may soon be reduced to one per cent.

Large property owners have been granted a new privilege this year in the buying of fire insurance. If a corporation has several plants, however small each unit may be, it can get a general cover insurance contract—a master policy covering all of the plants at a single low rate.

Automobile insurance has been considerably changed during the year. The changes are all in the direction of more liberal policy terms and lower rates. The rates for collision coverage have been made more flexible, and provision has been made for insuring the towing charges in case of mechanical breakdown. The most logical of all the changes has been the development of a new contract for fire and theft insurance which reduces the limit of coverage two or two and one-half per cent a month (which is about the average depreciation on an automobile) and cuts the basic rates by ten per cent.

One of the most interesting angles to the historical study of insurance is the efforts of state legislatures to curb automobile accidents. Everyone agrees that victims of motor accidents should be indemnified for their injuries and it is proper for the states to see that this indemnity is guaranteed. Legislatures have followed three different courses to accomplish the same purpose. The most effective work is in the field of accident prevention. The past year has seen many laws introduced requiring more rigid qualifications for drivers and the cancellation of licenses in case of chargeable accidents. The next best step has been taken by those states which require a motorist to be financially solvent, permitting him to choose for himself between insurance or possessing sufficient assets to meet damage claims out of his own pocket. The most attention, however, is focused on Massachusetts, which follows the third course and requires every motorist to carry liability insurance. The past year has shown an unsatisfactory record in Massachusetts. Insurance will not prevent accidents, and the rates to be charged have become a political football with nobody satisfied.

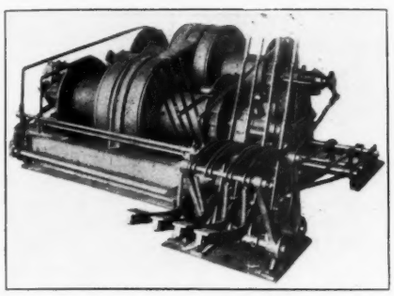
Fuller Lehigh Plant Is Moved to Barberton, O.

According to a recent announcement, the Fuller Lehigh Co., a subsidiary of The Babcock & Wilcox Co., will move its manufacturing operations and executive offices from Fullerton, Pa. The change is expected to take place within the next few months. The manufacturing operations of the Fuller Lehigh Co. are to be consolidated with those of The Babcock & Wilcox Co. at its Barberton, O., plant. The executive offices will be located at 85 Liberty Street, New York.

New Machinery and Supplies in 1930

New Dredge Hoist Uses Four Operating Drums

A new dredge hoist was introduced during the year by Street Bros. Machine Works, Chattanooga, and is illustrated here. Note its structural-steel frame, electric welded, and riveted; four drums, each equipped with ratchet and pawls, operated by



The new dredge hoist.

four levers in bank; drum gears of steel with machine-cut teeth; roller bearings, frictions and thrust; all parts lubricated through Alemite fittings.

The hoist is so designed that it can be made with any number of drums desired by purchaser.

Shovel Maker Announces New 3/8-Cu. Yd. Machine

One of the pioneer manufacturers of full-revolving, fully-convertible, ½-cu. yd. gasoline-engine-powered shovels, announced a new full revolving ⅜-cu. yd. machine during 1930. Speeder Machinery Corp. of Cedar Rapids, Ia., the manufacturer, states that this machine incorporates all of the features of its ½-cu. yd. shovel and, in addition, other features so necessary to high-speed traveling and operating conditions.

With a 14-ft. boom and 10-ft. dipper sticks as standard equipment, this unit employs a 41-hp., 4-cylinder motor. The shovel boom may be removed and either a 22-ft., 24-ft., or 26-ft. boom for crane or dragline operation may be attached. Either a pull shovel or a skimmer scoop may also be used. Other specifications of this new unit follow:

Electric lights and starter as standard equipment; optional two- or four-speed transmission; fully enclosed cab; Speeder patented cable crowd; five complete swing revolutions per minute; fourteen-inch tread shoe; very short tail swing; interchangeable truck mounting; overall width, 7 ft.; weight, 10 tons; all gears enclosed and running in grease.

The Speeder Corp. is now in full production on this new model. This gives the firm a range of sizes comprising machines of ⅜-, ½-, and 1¼-cu. yd. capacity.

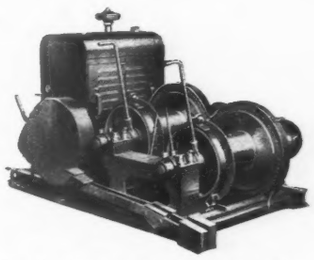
Introduces New Line of Gas, Electric Hoists

A new line of gasoline- or electric-powered hoists in seven sizes, ranging from 2-hp. to 27-hp. were announced this year by the Dake Engine Co., Grand Haven, Mich. Following the usual Dake design, the side frames which support the shaft bearings and the base are made in one piece. In the five sizes up to 20-hp., the frame is made entirely of steel, electric-arc welded. The steel channels, which are the side members of the base, serve as skids and are drilled for holding-down bolts and anchor chains. The cross members of the frames are angles and tubes. The hoisting drums with ratchets and brake drums are also of one piece electric-arc-welded steel construction.

The ⅜-cu. yd. shovel in operation.

Bronze-bushed cams running on the drum shaft engage the friction clutch and two ball thrust bearings minimize the operating lever pull.

The brakes are of the band type with one fixed end, the bands being made in two parts and fastened to-



Double-drum hoist with all-steel frame.

gether with an adjusting bolt conveniently placed on the top of the drum. They are operated by a rocker and lever, so that the brakes are smooth, positive and applied with a light pedal force.

Changes Screen Design to Insure Longer Life

The Allis-Chalmers vibrating screen was offered to the industry in the early part of 1930 and fifty-one were sold in the past year for screening a wide range of material, according to the Allis-Chalmers Mfg. Co.

During the year there have been several changes in the construction of the screens. The principal ones consist of additional clearance between the decks on multiple-deck screens, and improved lubrication and dust seals on the eccentric-shaft bearings. The bearings are now arranged so that they can be flushed out. These improvements will increase the life of the roller bearings and are a desirable feature where the screens are operating on abrasive material.

Suspension of the screens by cables and springs has been adopted as standard. This method of installation has been very successful as it has improved the mechanical operation of the screens and eliminates all secondary vibration from the supporting structure.

In June of this year, two Allis-Chalmers No. 9½ 840 Compeb mills for clinker grinding were placed in operation at the Prospect Hill plant of the Missouri Portland Cement Co. near St. Louis. These mills were designed to grind 175 bbl. of kiln-run clinker per hour to 92 per cent. minus-200 mesh. Their subsequent performance shows that the mills are now producing 200 bbl. per hr. 92 per cent. minus-200 mesh with kiln-run clinker feed. The average temperature of the clinker fed to the mills is 235 deg. F., and the temperature of the discharged cement

Compartment mill ready for shipment to Missouri Portland Cement Co. plant at St. Louis.

is 242 deg. F. This small increase in temperature is the result of the aerating effect of the air separators. Experiments have shown that, with clinker at 90 deg. F., the temperature rise is about 106 deg. The mills are each driven with 1,000-hp. Hytork synchronous motors with 10 per cent continuous overload rating.

Recently the Missouri Portland Cement Co. purchased a No. 9½ 835 mill to grind raw materials, using the dry process, for its Sugar Creek plant near Kansas City.

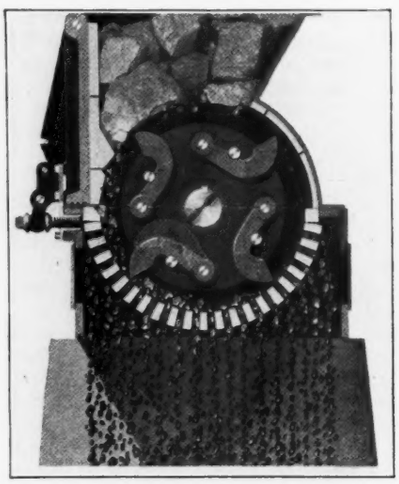
The sale of Allis-Chalmers Newhouse crushers held up very well for 1930 as more machines were sold than in 1929. The 5-in. size has been built and shop tests indicate it will be a very desirable machine for small plants and for handling rejections.

There have been few changes in the design of the Newhouse crusher in the past year. The principal change was the adoption of the ball-and-socket suspension for all sizes. This suspension permits the changing of eccentric throws for different crusher settings without changing the spider bushing.

Flexible-Teeth Feature New Type Roll Crusher

A slow-speed crusher of the single-roll type with flexible teeth was placed on the market early in the autumn of 1930 by the Jeffrey Manufacturing Co., Columbus, Ohio. The crusher, known as the Flextooth, was designed especially for reducing coal and similar materials to uniform sizes, smaller than can readily be produced by the ordinary roll crusher.

The machine is of heavy, rugged construction. A large flywheel pulley furnishes suitable belt drive direct to the motor pulley. The steel teeth, which are renewable, form the outstanding feature. As the illustration shows, they are kept in their outward position by centrifugal force and are so designed that this outward position is maintained at a very slow speed. When coming in contact with tramp iron or other hard material, the teeth are free to swing back, allowing the points of the teeth to disappear back of the outer face of the roll. This feature protects against breakage caused by foreign material getting into the material about to be crushed.



Sectional view of roll crusher with flexible teeth.

Hinged breaker plates allow easy access to all working parts and the large screening area assures a large capacity of uniform product.

Three Vibrating-Screen Units Added This Year

The Universal Vibrating Screen Co. of Racine, Wis., added three new units to its line of vibrating screens during 1930. Two new double-deck screen units—42 in. by 72 in. and 42 in. by 96 in. were marketed. These units are known as Type "M" double-deck screens.

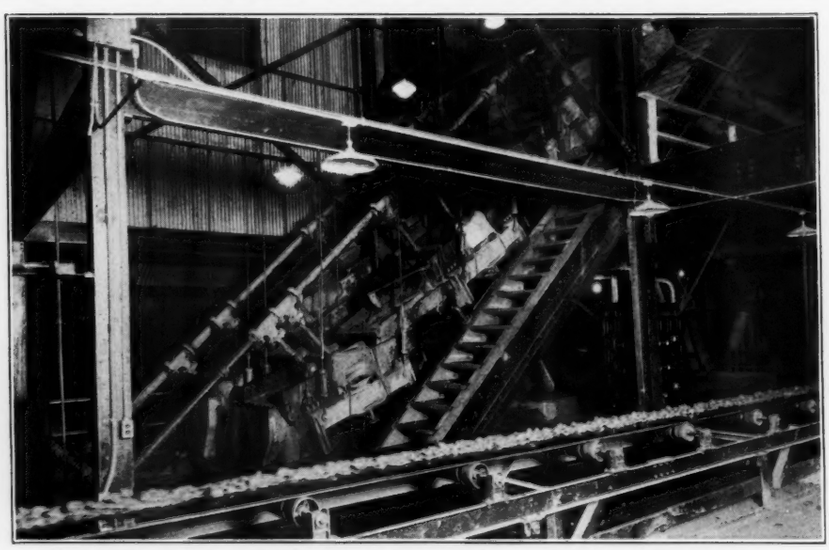
Another addition to the line was a small single-plane Type "C" screen, 36 in. by 58 in., designed especially for use on portable conveyors and loaders. The weight of this small screen is but 470 lb., but little more than that of the average plain gravity screen commonly used on such portable equipment. It is claimed that it is exceptionally rugged and compact in construction, tough pressed steel being used throughout, and that it is practically indestructible.

Quite a number of these new double deck and portable conveyor-type screens have been installed during the past year, and performance figures are available to all interested. Complete descriptive literature may be had by writing the company at Racine, Wis.

Battery of Twelve Screens Prepares Seven Products

Notable among the Traylor Vibrator installations made during the year 1930 is one battery of twelve single-deck screens. The total aggregate fed to these screens averages 400 tons per hr., and peak loads run up to 600 tons per hr. The stone contains a small amount of clay, which is removed by washing the material as it travels over the screens. Each screen has two spray pipes and the total water fed to the battery of screens is 5,000 gal. per min.

The twelve screens are operated from one motor-generator set. The operator controls the vibration of each machine from the central control board. The operator not only controls



This battery of 12 vibrating screens prepares several grades of washed sand and gravel.

the amplitude of vibration of each screen, but he may vary the vibration of the twelve screens by twisting the main rheostat. The electric vibration transmitted to each screen is 3,600 pulsations each minute. It requires but 9 hp. to operate this battery of screens under maximum load.

Each bank of six screens takes its feed by dividing equally the discharge from a 60-in. belt conveyor. The two head screens of each bank of screens are designated as type FB4, and the remaining ten screens are designated as FB2. All screens are equipped with undersize pans and the undersize stone passes directly to the next screen, while the oversize stone is gathered in the V-shaped box and is piped to bins.

The finished sizes are: plus 2-in.; 2-in. to 1½-in.; 1½-in. to 1-in.; 1-in. to ¾-in.; ¾-in. to ½-in.; ½-in. to ⅛-in.; and minus ⅛-in.

Tractor-Powered Shovel Has Improved Features

A new tractor-powered shovel was developed in 1930 by the Michigan Power Shovel Co., Benton Harbor, Mich., which embodies several outstanding features in this class of equipment.

In an effort to ease the work of the operator a new clutch mechanism with hydraulic control was designed, resulting in finger-tip manipulation. The new clutch will greatly increase speed of operation, as well as the operator's efficiency. It will be adaptable to other types of machinery.

Another outstanding improvement is the full swinging feature. The turntable mechanism, with the boom and dipper, is full revolving, but the tractor power plant remains stationary. This arrangement increases efficiency inasmuch as the weight of the power unit is not moved with each operation.

The operating width of the new shovel is considerably less, permitting narrower cuts than did the old-type machine with the swinging power plant.

Steering has been greatly simplified in the new machine with the use of two hydraulically-operated clutches mounted on the rear axle shafts of the tractor. The pressure control is furnished by a small gear pump driven from the tractor fan belt. This arrangement makes it possible to drive the machine independently of the turntable mechanism.

A ⅜-cu. yd. dipper is standard equipment, with a nominal capacity of 5 dips per min. Attachments such as cranes, clamshell buckets, and trench hoes can be used. The unit is designed to accommodate any standard make of tractor power plant.

View of tractor-powered shovel in digging position.

Link-Belt Developments of Past Year Reviewed

Link-Belt Co. made a large number of new developments in 1930.

In addition to the many new products, there have been many major developments in engineering, and designing of various types of equipment for specific installations.

A full-bucket-control type loader for skip hoists was added to the Link-Belt line of skip-hoist loaders. This new loader has a simple attachment, consisting of a swinging plate so arranged that, unless material is flowing through the chute in sufficient depth to maintain electrical contact, the skip hoist will not operate. In other words, there has to be sufficient material in the hopper to fill the bucket.

Pursuant to the plan for standardizing various driving mediums, H. W. Caldwell & Son Co. (subsidiary plant of Link-Belt Co.), developed two compact drives for screw conveyors.

Hyper chain, a new steel drive chain of unusual strength and durability, was introduced by Link-Belt in April. It is made from alloy steel, heat treated and uses a new type pin and cotter. Made to meet fine tolerance

Tooth formation of chain on minimum diameter of variable-speed gear.

requirements in production, this chain has an ultimate strength of 75,000 lb. for the Hyper SS-40, and 150,000 lb. ultimate strength for Hyper SS-124 chain. It was developed to meet a growing need for a more durable chain for heavy positive power transmission.

One of Link-Belt's important transmission developments of 1930 was an anti-friction, ball-and-socket pillow block, designed to fit any commercial grade of shafting. These pillow blocks are dust tight and pressure lubricated. They are carried in stock at strategic points throughout the country.

One of Link-Belt's most important announcements in many years was in June when it presented Promal, a new line of cast chains showing remarkable strength and durability in comparison with malleable chains.

The all-metal P.I.V. gear (positive, infinitely variable) was one of the major developments of the year. This product is an addition to the Link-Belt line of positive drives and is designed in 5 sizes, from 1- to 10-hp. capacity, providing speed ratios up to a maximum of 6 to 1.

Three Truck Models to Be Displayed at Show

Three trucks will be exhibited by The White Co. at the annual convention and road show of the American Road Builders' Assn. to be held in St. Louis, January 12-16.

White Model 64 is a six-cylinder chassis of 157-in. wheelbase, for heavy-duty dump trucks and for tractor-trailer operations. This is an extremely powerful heavy-duty chassis with a 100-hp. engine of the six-cylinder overhead-valve type with seven-bearing crankshaft. A four-speed heavy-duty-type White-designed transmission with White clutch gives added pulling ability in soft ground and

Model 63 dump truck and trailers loaded with crushed stone.

in excavations where heavy loads and steep grades make severe operating conditions. An auxiliary transmission can be furnished for the operation of winches and pumps.

White Model 63 with Wood hoist and dump body has two swinging partitions to carry dry batches. This chassis is of particular interest to road contractors, gravel and crushed-stone producers and to the building-materials trade. The Model 63 is powered with a six-cylinder, overhead-valve, seven-bearing-crankshaft engine. A range of five ratios is available to meet any type of hauling requirement.

White Model 212 will be equipped with a No. 2 Heil hoist and a 2-cu. yd. dump body. This model is a four-cylinder chassis.

Patents New Machinery to Weave Diamond Mesh

The Gehret Co. Inc. of Bridgeport, Pa., during the year 1930 patented machines for weaving diamond-mesh cloth entirely in any size mesh from ⅜-in. to 12 in. and all gauges of wire from No. 16 to ½-in. rods. The Company is now producing diamond mesh in sizes which have never been woven before in the history of the trade.

Diamond mesh is said to be far superior to square mesh on account of its strength.

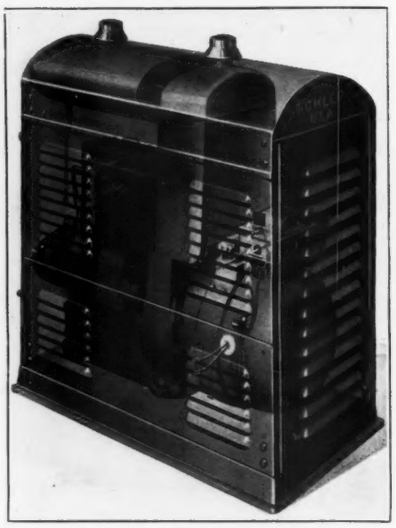
Electric-Lighting Plant Allows Night Operation

Twenty-four hour operation of equipment used by quarries and other industries engaged in outdoor work is made possible by a sturdy, self-contained Kohler electric plant which will be displayed in the Kohler of Kohler exhibit at the twenty-eighth annual road show of the American Road Builders' Assn., January 12 to 16, in St. Louis.

This plant, model EH 1½ kw. 110 volt d.c., is adapted especially for mounting on excavators, draglines, dredges, and other construction equipment. The unit is compact, measuring only 16 in. by 37 in. by 35 in. A strong sheet-metal housing protects its smooth-running four-cylinder engine and direct-connected generator from the elements and encloses a 7-gallon gasoline tank. All controls are on the outside of the hood.

Neither vibration nor a sudden jolt affects the action of a Kohler electric plant. It can be transported on skids, wagons or trucks over rough, roadless country without damage, making it especially adaptable to the needs of road builders.

Besides furnishing current for flood-lighting, which illuminates the entire working area, Kohler plants operate such power equipments as motors,

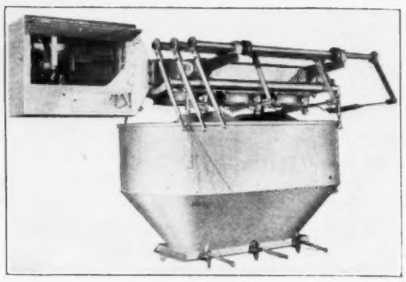


Phantom view of electric plant.

pumps, air compressors, lathes, drills and saws. Three different models, one a cut-away type, will be exhibited at the 1931 Road Show.

Exhibits Weigh Batcher Line at 1931 Road Show

A new multiple material weigh batcher designed for concrete mixing plants will be exhibited by the C. S. Johnson Co., of Champaign, Ill., in Space No. 24 in the Arena at the Road



The automatic scale batcher.

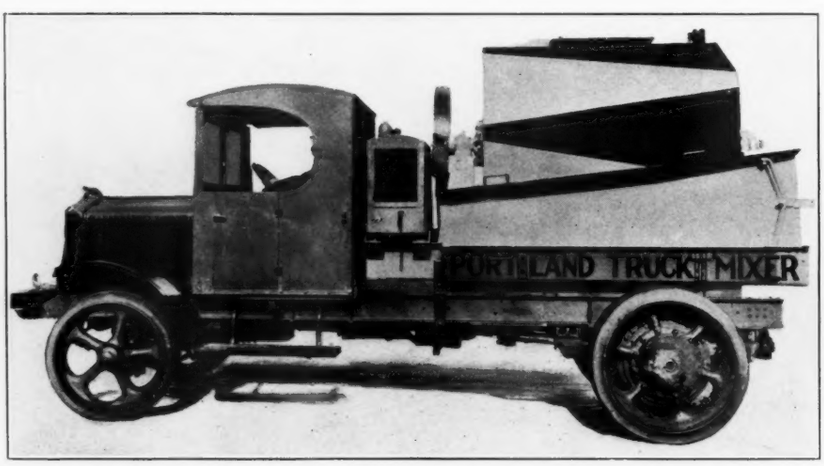
Show in St. Louis next month. The batcher is constructed to handle three aggregates and is divided into three compartments, the weight of each compartment being controlled by a separate beam which eliminates any adjustment after the beams are once set.

The exhibit will also include the improved bantam weigh batcher, a new bulk-cement-handling cart, and standard single-material weigh batchers for sand and stone.

C. S. Johnson, J. C. McLean and K. H. Melzer will represent the company at the show.

New Design in Concrete Carriers Is Developed

In order to provide a carrier for ready-mixed concrete which can also be used for mixing enroute, and which will at the same time be free from vanes, fins or other internal obstructions to be caked with concrete, Portland Concrete Machines Co., of Cleveland, O., introduced the Portland truck mixer, as shown herewith, during the year 1930. The unit is separately powered by a 7½-12-hp., 4-cylinder Le-Roi engine, making it independent of the truck's power take-off and avoid-



A new truck-mounted concrete mixer.

ing drains on the truck motor. This also simplifies mounting, which can be made on any standard 5-ton chassis. The unique shape, with offset hexagonal heads and triangular panels sloping alternately forward and back, keeps the contents thoroughly mixed, and retains plasticity and workability of the concrete for more than 3 hours. The loading and discharge openings are unusually large and easily operated, and the outward flow of concrete can be controlled very quickly and accurately by toggle-operated butterfly doors. The unit is equipped with a stub chute discharging up to 43 in. above grade, and also a one-piece, 8-ft. swiveling extension chute.

When desired, a flanged, removable top section is provided so that the drum can be used as an ordinary dump body as well as a concrete carrier and mixer. This will appeal to those who have part-time needs for both kinds of bodies, but dislike tying up truck investment which is not fully used.

The 3-cu. yd. size is now available, and the 5-cu. yd. model is forthcoming. The design has aimed at economy both in weight and cost.

Maker of Motor Trucks Enters Low-Priced Field

A newcomer in the 1- to 1½-ton field was announced by the Federal Motor Truck Co. of Detroit during the summer of 1930. This was designated as Model D, a 4-cylinder truck that combines speed, appearance and economy with low cost.

The all-truck construction and modern design of Model D makes it a very practical unit for 1- to 1½-ton transportation. It is claimed that this model successfully combines the essentials of light, fast transportation with the endurance qualities of the heavy-duty models.

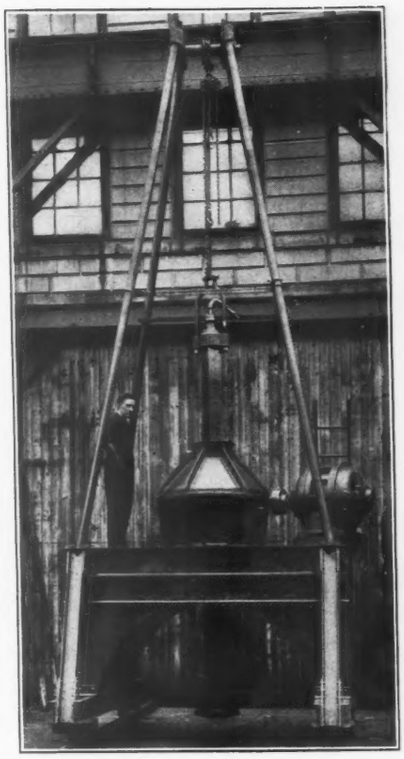
Model D is powered by a capable 4-cylinder L-head engine developing 47½ horsepower at 2,500 r.p.m., a power-plant which is said to introduce a new idea of smoothness in 4-cylinder performance. It has an unusually heavy, heat-treated crankcase and large rugged bearings. Front-end drive is by silent chain; cooling is by a centrifugal water pump located at the side of the cylinder block. Force-feed oiling supplies adequate lubrication to all working parts. The engine is equipped with governor, air cleaner, oil filter, gasoline strainer and mechanical fuel pump.

The new Federal has a 4-speed transmission, providing a wide range of power and speed. The rear axle is a full floating type, which is particularly designed to meet present-day operating conditions and adapted to the use of dual- as well as single-wheel equipment. The single dry-plate 10-in. heavy-duty truck clutch has an extra wide face. Four-wheel, internal-expanding, fully-enclosed hydraulic brakes are 15-in. in diameter by 2-in. wide. The frame is the pressed-steel channel type, 6 in. deep by ¼ in. thick, adequately reinforced by five heavy cross members. Springs are long and flexible, providing easy riding under varied conditions.

The Model D is low-hung and combines good looks with an appearance of sturdiness and all-around capability. It exemplifies the modern trend toward distinctiveness in design. The front view is enhanced by the high, chromium-plated radiator, the large headlamps supported by a tie-bar connecting the two front fenders, and the heavy channel steel bumper supported by brackets built integral with the chassis frame. The shapely cowl and louvres and the colorful finish impart a definite touch of style to the entire unit.

Drill for Granite Cuts Core 50 In. in Diameter

Of the new machines developed by Patch-Wegner Co., Inc., Rutland, Vt., in 1930, one is of particular interest to the readers of PIT AND QUARRY. It is a core drill for quarrying granite by drilling holes in the granite bed. The driving mechanism of this machine is shown in the accompanying photograph. The bit is 52 in. diameter by 7 ft. high, made in the form of a cylinder. The core of granite produced by the bit is approximately 50 in. in diameter by a length of 4 to 6 ft. depending on the length of the bit. This machine has been placed in operation and has shown a capacity much greater than first anticipated. The 52 in. diameter bit will sink into the granite in the quarry where this core drill is being operated at a rate of 9 to 12 in. per hour, and the cost of operation is low.



Huge core drill for granite deposits.

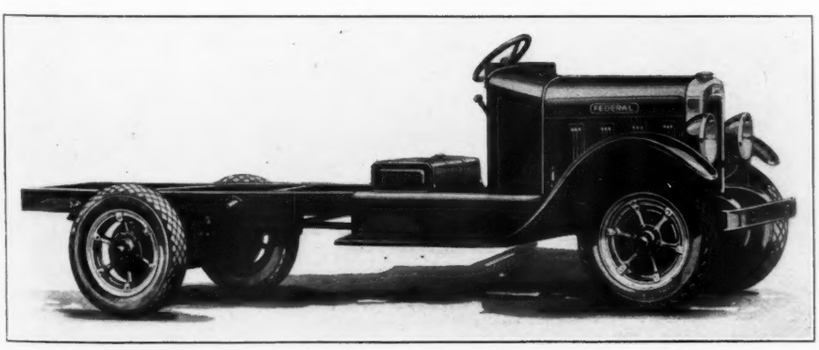
With this core drill it is possible to start the bed or sheet without blasting or any other method of channeling which wastes the stone. The machine is mounted on a track and drills a series of 52-in.-diameter holes approximately a foot apart. The machine will drill to a depth of 30 ft. so it is possible to open up a deep channel of sufficient width for satisfactory quarrying operation.

In addition to the low cost of operation, this core drill has another economic feature. As the cores are 50 in. in diameter the stock can be utilized in a great many ways, and thereby becomes an asset instead of a liability.

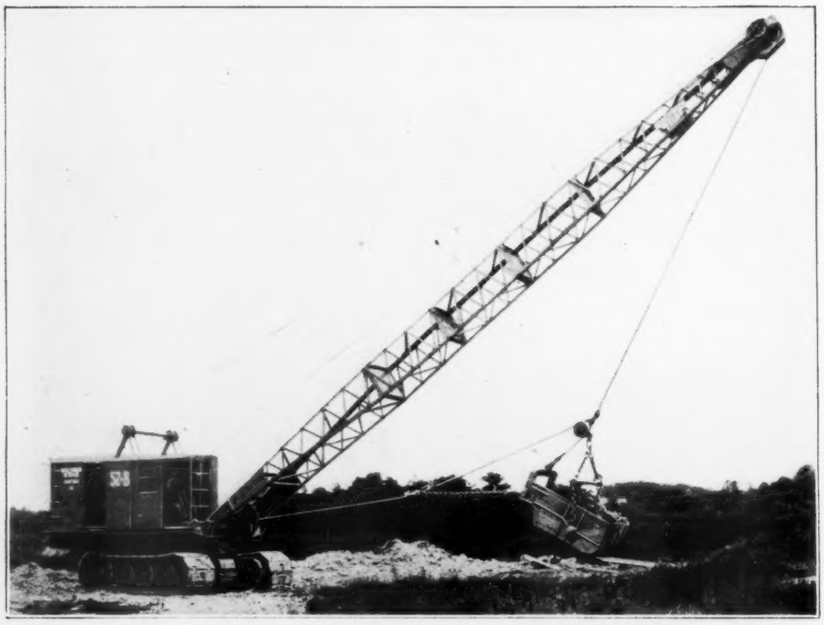
Offers New Excavators to Industry This Year

"To stand still is to go backwards." This is more true today in the present period of business inactivity than it is at times when business is progressing at a faster rate. In these days of an ever increasing use of machinery, "normal progress" is no progress. Bucyrus-Erie Co. of South Milwaukee, Wis., points out the following new products offered during 1930 to the excavating industry.

The new 52-B 2¼-cu. yd. Diesel is said to combine high speed of operation and the economy of Diesel fuel with several features new on this size of machine. These features include a slow-speed, six-cylinder Diesel engine, arrangement for shipping on a flat car without dismantling, independent swing and propel, oversize crawler mounting for dragline work; steering from the operator's position, all high-



The 1- to 1½-ton truck chassis.



The 52-B Diesel-operated machine working as a drag-line.

speed shafts mounted on ball or roller bearings.

The 1035 gasoline clamshell, convertible to shovel, dragline or crane, is a machine combining such modern features as the mounting of all continuously running shafts on ball bearings and completely inclosed engine transmission, with such unique features as the new swing and propel reversing unit. This unit, with all shafts mounted on ball bearings, is mounted in one single heavy casting and completely inclosed.

The 1025, a new ⅝-cu. yd. shovel, crane, clamshell and dragline, includes all the modern features found in the 1035 mentioned above.

The 42-B, a 1¼-cu. yd. steam shovel, combines strength for the heaviest kind of digging with the speed of a much smaller machine.

The 170-B brings to the quarry and mine operator the output capacity of the 5-cu. yd. shovel coupled with all the rugged strength of the old railroad shovel and the many advantages of the full revolving shovel. It is a larger companion to the 120-B shovel known to quarry and mine operators the world over.

A 200-ton railway crane lifts a maximum load of 200 tons at a 17½-ft. radius. Its most interesting features are low center of gravity permitting high-speed transportation, very strong construction, an unusual degree of accessibility and great clearance for lifting bulky objects.

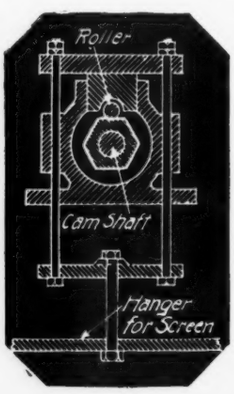
New Vibrating Screen Hangs from Cam Roller

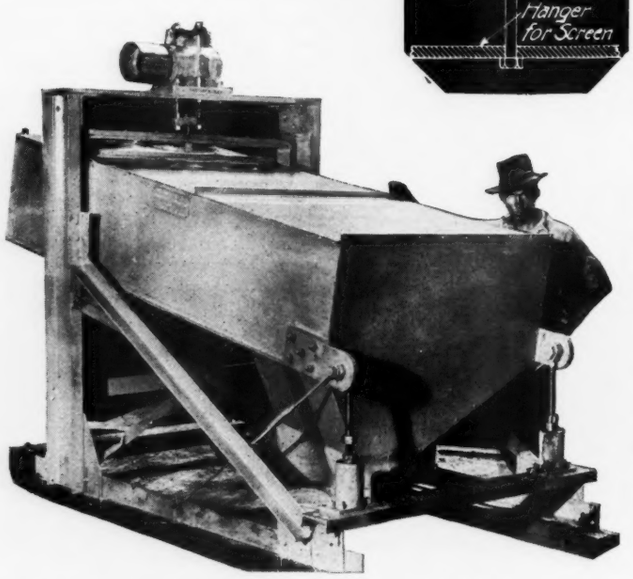
For years the Williams Patent Crusher and Pulverizer Co., St. Louis, Mo., has specialized entirely in crushing and grinding machinery and has seldom departed from that field. However, the work of its new Kam-Tap vibrating screen has been so impressive during its months of development and use that the firm felt amply justified in adding it to its line in 1930.

This new screen has many uses in the quarry industries. It can be used as a single-deck scalper or, in the three-deck type, can be employed as the main separating unit. In the latter work the Kam-Tap will make accurate separation and will deliver unusually clean binder rock free from fines. In screening silica sand, asphalt filler, talc and for other fine work the Kam-Tap is said to have no equal. Gravel producers can use the screen to advantage for removing oversize gravel and for intermediate separations of sized gravel.

As will be noted in the illustration, the entire screen frame hangs from the cam roller which, as it rides over the cam points at high speed, causes the vibration and the motion which shakes out the fines and keeps oversize material from blocking the screen openings. Cams with 4 to 8 points are available and are interchangeable and by increasing or decreasing the number of cam points and by regulation of the cam-shaft speed, vibration is adjusted as regards vibrations per minute, range of rise and fall, and violence or speed with which the screen is raised and lowered. Cams operate in an oil bath and have a long life as the cam roller passes over the cam points with a rolling rather than rubbing motion.

The screens are built in ten popular sizes and with one, two or three decks.





New vibrating screen particularly adapted to sizing fine materials. Upper right—Details of the vibrating mechanism.

Easy Handling Features Bull-Scoop and Scraper

The LaPlant-Choate Mfg. Co. of Cedar Rapids, Ia., introduced this year and is now manufacturing a new bull-scoop for use on the Caterpillar 10 tractors. The manufacturers state that this tool is particularly adapted for use on short hauls where speed of operation is desired. The scoop will carry approximately ¾-cu. yd. heaped measure, and is equipped with four wedge-like teeth so arranged as to spread material up into the scoop.

The bull-scoop will easily dig into frozen ground, stubborn sod, and surfaces of similar nature, and the dumping unit as well as the bulldozer blade on the front are so balanced as to enable the machine to work almost entirely automatically.

The bulldozer blade is quickly dismantled by pulling a rod and removing two bolts, and the scoop can also be quickly removed to make the drawbar accessible for immediate use.

This equipment is simple to handle and the depth with which the scoop will dig is regulated by the tractor driver from his seat.

Another addition to the LaPlant-Choate line was the hydraulic roll-over

scraper, a piece of equipment which gives the operator rapid and easy control, either in regulating the depth of cuts taken, or in leveling the dirt when dumping. Dirt may be either leveled when dumping, or may be dumped in heaps.

The control is a hand lever mounted on the tractor. This hand lever controls the hydraulic valve. Forward movement of the lever makes the Scraper dig in, in back position of the lever, the scraper pulls out and, if left in back position, the scraper rolls on back to carrying position. In center position the hand lever holds the scraper in any desired position.

Presents New Crushers and Vibrating Screens

The Kennedy-Van Saun Co., owner and inventor of the well-known ball-bearing gearless gyratory crusher for primary and secondary work, placed upon the market during the past year a crusher that is equipped with spring release for letting metallic substance through the secondary machine. This is accomplished by suspending the head and shaft on a nest of springs set by hydraulic pressure and held together by bolts so that these springs are always positioning the head and shaft for the hardest rock.

This crusher may be driven by a quarter-turn belt from a standard motor, or a straight belt from a vertical motor, or it may be equipped with the synchronous motor built in the pulley. This motor has formerly been built with a 75-per cent starting torque and a 150-per cent pull-out torque. This did not enable the starting of the crusher when the opening between the head and concaves was full of rock or ore. The company, however, has developed a synchronous motor having a 200-per cent starting torque and a 250-per cent pull-out torque. This enables the starting of the motor-driven synchronous crusher in either the standard or secondary crusher when the opening between the head and concave is full of stone. This was tested out recently by the Shawinigan Engineering Co. at their plant at Rapide Blanc, Province of Quebec, Canada, starting two 14-in. crushers on basalt. Each of these crushers was equipped with a synchronous motor built in the pulley, the stator being the inside of the motor and the rotor being the outside part of the motor.

These crushers were tested under three conditions of load: one-third full, two-thirds full, and full. In each test, the two crushers were started simultaneously and without throwing any disturbance on the power line because of the low inrush of current due to the use of synchronous motors which have the highest efficiency of any motor built. It will also be observed that this was only possible because of all the moving parts being carried on ball bearings, thus leaving nearly the entire power required to operate the machine to be applied to the breaking of the stone.

Twenty-two sizes of this style of crusher are being built. There are nine of the crushers for fine crushing, thus covering a wide range. The largest machine weighs something like a million pounds while the smallest weighs approximately one thousand pounds.

The Kennedy-Van Saun Co. also developed two types of vibrating screens: (1) Type A for handling stone 3-in. and smaller and (2) Type B for dealing with the product direct from primary jaw or gyratory crushers. The accompanying cut gives the general appearance of this screen. One of the normal features is that the lubricant of this screen is maintained in its place by sealing with machined faces and without packing the housings surrounding the Timken roller bearings so that the lubricant is never thrown out of the bearings by centrifugal force which insures long life to the bearings. This screen takes little power and is driven by a K-V drive. This drive enables the proper speed of the screen regardless of the characteristics of the electric current or it can be driven from the countershaft of the elevator, if desired.

Lubricants are securely sealed in this new vibrating screen.

Reinforcement Castings Save Dipper-Door Wear

The American Manganese Steel Co., Chicago Heights, Ill., in the fall of 1930 placed before the trade a new type of dipper-door reinforcement casting, called the Meyer turtle-back.

This casting, made of Amsco manganese steel, can be applied to any dipper door that is flat inside and that has not become distorted. The turtle-back, on which patent has been applied for, is convex to the work, and of ample size and strength to protect the door and mechanism from severe shock and distortion.

Turtle-back reinforcement for dipper doors.

The turtle-back is designed to reduce wear and eliminate the bothersome door and latch troubles caused by falling rocks, the shock from which permanently distorts door sheets.

It is made to suit all dipper sizes, and is quickly and easily secured to the inside of the door so as not to interfere with door braces and latch mechanisms.

New Oxygen Regulators and Blowpipe Make Bow

A constant line pressure free from any fluctuation is most desirable for good results in oxwelding. The Oxweld type R-43 oxygen-welding regulator, introduced during the year by Oxweld Acetylene Co., New York, guarantees a freedom from fluctuation by means of a system of two-stage pressure reduction. This two-stage reduction is accomplished through two separate and independent sets of diaphragms, valves and springs. The full cylinder pressure of 2,000 lb. enters the regulator through a stem-type valve and is controlled by the first stage diaphragm. In this stage the pressure is reduced to less than 250 lb. per sq. in. This pressure will be constant for any one regulator, but varies somewhat with different regulators. The pressure here is non-adjustable.

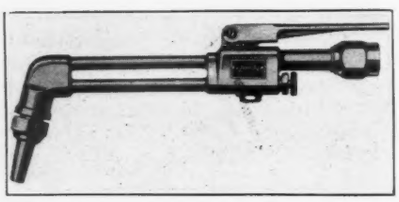
The oxygen then passes from this first reduction assembly to a second stem-type valve and diaphragm assembly where the pressure is reduced to the working pressure desired by the operator. This pressure is regulated by the operator by means of the adjusting screw, and any operating pressure may be obtained without fluctuation.

The new Oxweld type W-17 welding blowpipe, another new development of 1930, is designed to meet the strictest requirements for a light, sturdy, economical, efficient, general purpose welding blowpipe.

This new blowpipe operates on the injector principle. The mixing chamber has been placed just in front of

Oxygen welding regulator.

the handle. Improved design in this feature assures an even, thorough mixture of oxygen and acetylene in exactly the right proportions. Under the most abusive conditions the Type W-



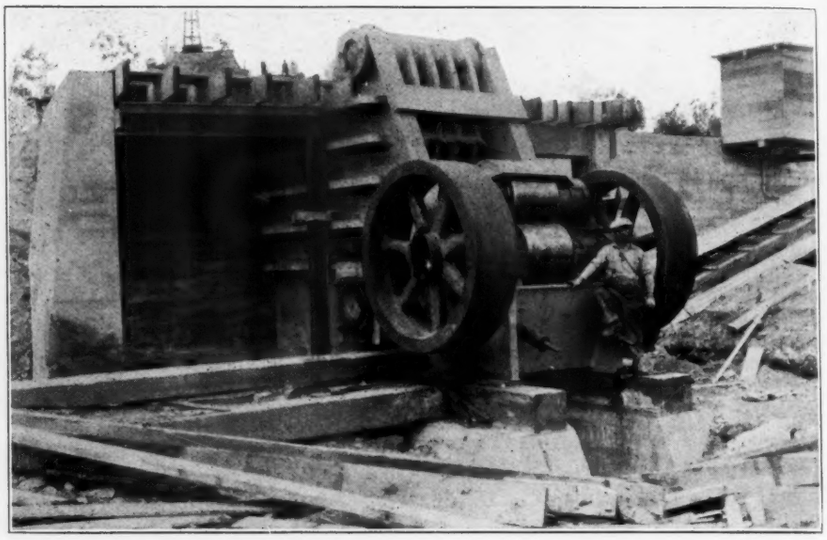
Cutting attachment for blowpipe.

17 is said to be as near a non-backfiring blowpipe as has ever been designed. It will not backfire under normal working conditions, no matter how severe.

Sturdily built—it can be used without loss of efficiency and without fatigue for continuous welding for long periods on either light or heavy jobs. Size and weight have been carefully balanced in a ratio that assures free and easy welding. The convenient shape of the W-17 makes it especially adaptable for use in difficult or confined positions. The ribbed handle affords a firm and natural grip. Valve wheels are recessed—making the valve stems short and compact. Ribbed valve wheels afford positive manipulation. The valve stems are of monel metal. This renders these parts noncorrodible. The strength of monel metal also prevents bending of the valve stems.

Huge Jaw Crusher Turns Out 15 Tons per Minute

The New England Road Machinery Co. this year completed and tested what is said to be the largest welded breaker built in this country. After several months of hard usage in the plant of the Saugus Sand & Stone Corp., it has proved to be a wonderful success.



The size of this huge jaw crusher is indicated by comparison with the man in front of it.

The machine is a 42-in. by 48-in. jaw crusher and is operating at the rate of fifteen tons per minute with the jaws set to 5 in.

In designing and building this breaker the company made a radical change in both design and construction. The purpose was not only to produce a breaker of greater efficiency, but also to develop one which would have certain definite economical advantages. The main part of the breaker is entirely electrically welded. The type of construction reduces the weight considerably over the old method of using castings. It has a total weight of approximately 80 tons, and was moved from the factory to the Saugus Sand & Stone Corp. plant in two sections.

In addition to the economies effected through the use of less material, fewer parts, reduced cost of moving and setting up, there are decided improvements made possible by using plates. Because of the decreased weight and improved design, less power is necessary for operation.

Finds Growing Use for Carbide Lighting Plants

During the past year extensive improvements have been made in National Carbide V. G. floodlights, marketed by the National Carbide Sales Corp. of New York, N. Y.

These lights are designed principally for construction, repair and emergency work.

Operating on the carbide generator principle of "carbide to water," there is no after-generation. The complete charge of carbide may be used without waste, whether the lights are operated intermittently or continuously. The carbide simply feeds into the water, only as required to maintain a steady light.

In this connection, the following is quoted from the November, 1930, report of the Oxy-Acetylene Committee of the International Acetylene Association:

"A wide market has developed for the small portable acetylene-generator type of floodlights. These devices are of simple, rugged construction, readily portable, and furnish a satisfactory light in all kinds of weather. Extensive use is made of them for all kinds of night work where large areas must be brightly illuminated. It may be noted that such acetylene floodlights are finding favor even in competition with electric light because of the simplicity and relative ease of portability of the acetylene lights."

New Clam-Shell Bucket of Rugged Construction

The class K digging clam-shell bucket was one of the new developments of the Hayward Co., New York, N. Y., in the past year. The bowl of the bucket is made of one-piece steel construction, has manganese steel bushings, shoes and teeth, and hardened steel shaft and pins. The rods are of extra heavy pipe; the upper and lower ends are steel castings and the whole is electrically welded into one piece.

Clamshell bucket of one-piece construction.

Admixture for Concrete Insures Watertightness

The Vaso Manufacturing Co., Seattle, Wash., placed on the market this past year a new type of admixture known as Vaso. It is a bituminous liquid. It is claimed by the manufacturers that Vaso permits the use of twenty per cent less mixing water than usually used in concrete. By the use of less mixing water and Vaso, a plastic and homogeneous mix is secured and the workability is also improved.

Vaso was first developed to overcome the hauling problems of central-mixing plants using flat-bottom or bath-tub type of trucks. Such firms usually have difficulty in hauling rich building mixes over three or four miles without separation of aggregates. Vaso overcomes this problem by holding the aggregates in suspension. When the mass is dumped no separation has occurred and the entire mass slides easily out of the trucks. The manufacturer claims concrete can be hauled as far as 25 miles in this manner.

One of the unique features of Vaso is the small quantities necessary to use—only one pint equal to one pound is used to each cubic yard of concrete.

The manufacturers also claim that watertight concrete can be more easily manufactured with Vaso by the elimination of rock pockets and air voids caused by excess mixing water.

The company has prepared an interesting folder entitled "Concrete Insurance," which it will mail to firms interested in their product.

Presents 3 New Shovel Models During the Year

During the year Bay City Shovels, Inc., Bay City, Mich., developed and announced to the trade new equipment as follows:

Model K2, a full struck measure, heavy-duty, half-yard, full-crawler-mounted, convertible shovel, crane and dragline weighing 18 tons.

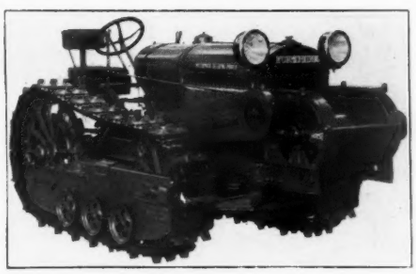
The Bay City Cranemobile, a rubber-tire-mounted, tractor-powered convertible crane, shovel and dragline weighing 11 tons and having lifting capacities up to two tons.

About December 15, the company announced the Model S, a full revolving, 1-cu. yd. convertible shovel and crane with full crawler mounting, weighing 31½ tons, with lifting capacities ranging from 15 to 20 tons. This machine is of similar design to the present Bay City Model R full revolving, ¾-cu. yd. convertible shovel.

Light speed crane on rubber-tired wheels.

Will Exhibit Crawlers, Shovel, Hoists at Show

The new Trackson Model GH crawler will be a feature of the Trackson exhibit at the 1931 road show at St. Louis, Mo. This crawler is the latest development in the company's well-known line of tractor equipment, and is attracting a great deal of attention because of its many outstanding improvements. It is an entirely new machine, with increased capacity, and with even greater adaptability than was afforded in previous models for the in-building of other equipment.



Hoist mounted on crawler tractor.

Four forward speeds and a reduction gear drive give the Model GH Trackson remarkable power and flexibility. The widespread tracks (75 in. overall) have 1,750 sq. in. of ground contact and the ground pressure of the entire crawler tractor is only approximately 4¼ lb. per sq. in.

The GH crawler will be displayed at the Road Show equipped with the new Trackson high shovel, another important development of the past year. This shovel is ideal equipment for the materials-handling operations. It is both a digging and loading unit, combining all the advantages of a low-lift shovel for digging and high-dumping clearance for loading into trucks.

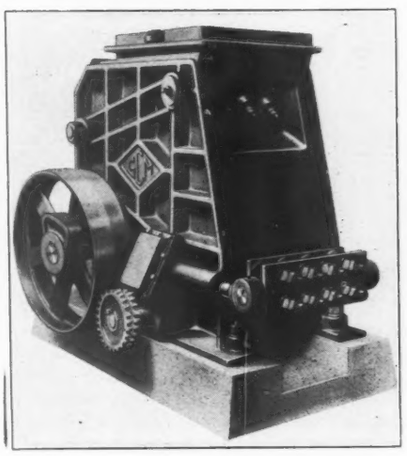
Trackson crawler wheels, which are designed for mounting on wagons and trailers of various makes, will be displayed at the show, in the 6-ton, 10-ton, and 15-ton sizes. These wheels are the answer to the heavy hauling problems of every industry, for no matter how difficult the ground conditions, they can be depended upon to deliver their loads.

The Model LH Trackson is a lighter and faster crawler than the heavy-duty Model GH. An LH crawler unit equipped with the Trackson hoist will be on display at the show. It has a wide range of usefulness which includes such work as double elevator operation and dragline excavation.

The Trackson hoist may readily be converted from a single- to a double-drum hoist, or vice versa. The auxiliary drum may be installed directly over the main drum whenever the user needs it, without any alterations.

Yielding-Jaw Crusher Is Developed in Far West

One of the most radical improvements made in jaw crushers for the past fifty years is embodied in the new GCM yielding-jaw rock and ore crusher now being manufactured by the Guest Crushing Machines, Inc., at Los Angeles, Cal. This new crusher first produced in 1930, in the result of many years of experimental and development work on the part of William W. Guest who has, for the past forty years, been occupied with the developing, designing and operating of mine equipment.



New crusher incorporating yielding-jaw principle.

During the past five years Mr. Guest has devoted his entire time to supervising the manufacture of the most advanced types of rock and ore crushers which have been successfully marketed.

The crusher incorporates the yielding-jaw principle and utilizes roller bearings throughout. The crushing action, after material is reduced to size, is downward for ⅛ of each revolution, serving to give the added impetus over the action of a free-falling body. The machine may be used as a

primary and secondary crusher or as either. The 6-in. by 16-in. size illustrated will handle nine tons of rock per hour when set at ¼ in. This takes into consideration a maximum feed of 6-in. materials, delivering a uniform crushed product of 5/16-in. size. The ratio of reduction in this particular case is 19 to 1.

Outstanding features include a breakable shear pin which prevents throwing the motor shaft out of alignment in case foreign material becomes lodged in the crusher jaws. Provision is also made for instant release of this foreign matter without the necessity of explosives or expensive dismantling. All working parts are readily accessible.

Pilot Switch for Pumps and Similar Machinery

A new three-position pilot switch permitting either automatic, manual, or "off" control for pumps, compressors, and similar machinery was one of the many new pieces of electric control apparatus announced in 1930 by Cutler-Hammer, Inc., Milwaukee, Wis.

This type of machinery frequently requires manual control, which was formerly impossible to obtain in the usual type of float switch or pressure switch. When the operating lever of the new switch is placed in manual position the circuit is closed and the motor will run continuously regardless of any other control device. When placed on the automatic position the automatic pilot device is in circuit and normal automatic operation is obtained. The lever will remain in any one of the three positions.

Belt-Conveyor Carrier Uses Roller Bearings

A new roller-bearing belt conveyor carrier, known as the Pacific type, was one of the many 1930 developments of Stephens-Adamson Mfg. Co. of Aurora, Ill. Timken bearings are used throughout and the carrier is featured for use wherever a high-grade conveyor of medium price is wanted.

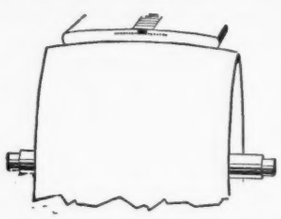
Belt conveyor carrier using roller bearings.

As the illustration shows, it is of the three-roller, 20-deg. trough design now favored by most engineers. The construction is of heavy-gauge pressed steel, with the single exception of the end stand castings making the carrier light in weight, strong, rigid and practically unbreakable.

Each roller turns upon two Timken tapered roller bearings housed within an inner hub of steel tubing and well protected from dust and moisture by an intermeshing labyrinth grease seal for each bearing. The tapered roller bearings used are large in size and are arranged to carry end thrust as well as radial loads. The inner hub extends the full length of each roller and prevents any chance for misalignment of bearings. A unique arrangement has been provided for adjusting and setting the bearings for proper clearance. Positive lubrication is insured by an individual Alemite fitting for each bearing.

Flexible Belt Fits Any Type of Power Pulley

A new construction in transmission belting was announced in the year just closing by Cincinnati Rubber Mfg. Co., Cincinnati, Ohio. This new belt, which is called Cincinnatus Duoflex because of its duo-flexibility both crosswise and lengthwise, is designed to give greater



Showing how the new type belt, with crosswise flexibility, hugs the crown of the pulley.

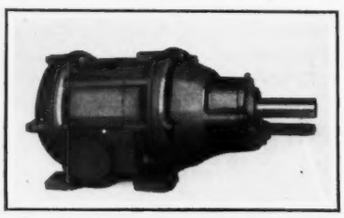
pulley contact, thus delivering more horsepower. It is built to fit all kinds of pulleys, flat or heavy crowned, large or small, with a gear-like grip. The reason for the close pulley hug is an automobile tire-cord insert giving remarkable crosswise flexibility and exceptional adhesion under the seam. Where many belts slip and strain, this belt operates with slack, delivering greater horsepower and longer service and life with less fastener trouble.

Duoflex belting is a development of practical experience and scientific engineering, factory tested to meet every demand for greater power transmission in modern high speed production. The general advantages of this belt are: Maximum power transmission, it hugs the pulley with a gear-like grip, fits any type of pulley, large or small, regardless of crown, evenly and securely, can be operated with more slack, less tension, and consequently less strain on fasteners, less belt tension, resulting in less slippage, longer life, and better service, and, finally, flexibility combined with the great strength of the hard duck body makes it one of the best belts for modern high speed operation.

Speed Reducer Combined With Motor in Housing

The Cleveland Electric Motor Co., of Cleveland, O., introduced, in 1930, a motorized speed reducer particularly suited for general use in the cement mill and in quarries and pits on conveying systems.

The unit consists of a standard motor mounted integral with planetary



Combined motor and speed reducer.

reduction gears. The gears are mounted in an absolutely oil-tight housing.

This unit provides the ultimate in compactness and is an exceptionally efficient straight-line drive.

Standard motor speeds are reduced to a desirable final speed of from 50 to 550 r.p.m. Motors can be furnished in single speed, multi-speed, high torque or enclosed designs for either horizontal or vertical mounting. The unit is built in capacities from ½ to 20 hp. motor rating.

The company manufactures the entire unit in its own plant and guarantees the electrical end for three years against any electrical defect.

Spray Nozzles Increase Production of Screens

Revolving and vibrating screens when equipped with hydraulic spray

Fig. 1. Cut-out view of the nozzle.

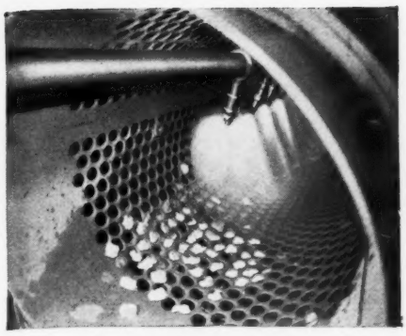


Fig. 2. Spray nozzles in action in revolving screen.

nozzles not only produce a clean product washed free of overburden, silt, clay balls, and other foreign substances, but the nozzles tend to increase the capacity of the screens. The Binks Manufacturing Co., Chicago, manufacturers of industrial spray appliances since 1898, have this year developed a line of gravel washing nozzles, as illustrated by Fig. 1. Nozzles are constructed of bronze composition metal and made in suitable sizes depending on size of screen operations, water requirements and so forth. Fig. 2 illustrates a typical installation of nozzles in connection with revolving screens, and Fig. 3 shows the

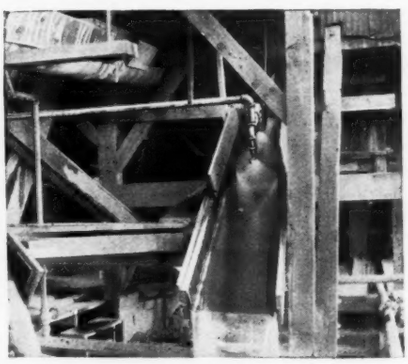


Fig. 3. Spraying material on a vibrating screen.

same type of nozzle employed in connection with vibrating screens.

Nozzles are designed with a stationary internal two-vane helical core which sets up a tremendous velocity within the whirl chamber and discharges a full mass spray of equal density throughout the entire cross section of the spray cone, which fully penetrates all material under which nozzles are directed.

Drag-line Bucket Made of Special Alloy Steel

The Northwest Engineering Co., builder of shovels, cranes and draglines, exclusively, late this year announced a new drag-line bucket. Through scientific design and the use of special alloy steels, a bucket of great strength and light weight has been developed. This bucket has been subjected to a load of 34,000 lb., enough to spring it out of shape temporarily, but it has always resumed its original form without any permanent set remaining.

In the Northwest drag-line bucket the arch is a casting of I-beam section. The hitch is placed so that blows received in striking the bank are taken on the arch. The lip is of rolled alloy steel, welded directly to the arch, and the two are heat-treated as a unit. The basket or load-carrying portion is formed from a single piece and is welded at the corners. This provides a clean smooth interior that sheds sticky materials quickly.

The dumping sheave is designed to promote long life in the cable. It and the hoist trunnion pins are of hardened steel. All castings are heat-treated.

All welding is done by a special method which insures a ductile, flexible weld that will withstand shock.

New Respirator Guards Workers from Dusty Air

Outstanding among developments in safety devices during the past year and of particular interest to the pit and quarry industry was the new type respirator or breathing mask introduced by Wilson Products, Inc., Reading, Pa.

This company, coöperating and in direct touch with a large industrial company, has been working on this type of mask for many months but did not offer it for general use until it had been thoroughly tried, tested and changed many times.

Filling a definite need in industry, this mask is being accorded a generous reception by many trades where various operations are necessarily in atmospheres of dry dust. With a large area of breathing space, the bag filter, used dry, offers no interference with speech or breathing. Full freedom of vision is allowed and eyeglasses or safety goggles can be worn with it.

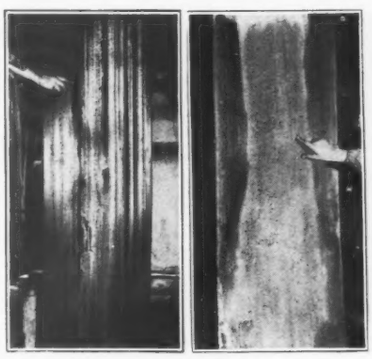
Designed for comfort as well as efficiency, no part touches the face except the soft filter bag which folds back over an anatomically shaped rubber form and is kept distended by a ball-shaped light wire spring. Economical, too, the filters can be washed and used many times over. All parts are interchangeable and replaceable without tools.

New type of respirator.

Belt-Surfacing Material Reduces Upkeep Expense

A new self-vulcanizing rubber-paste compound, known as "Covulc," for surfacing conveyor belts, hoppers, chutes, agitators and similar equipment used in handling crushed stone, gravel, sand and other abrasives was put on the market during 1930 by The Hitchcock Co., of 48 Pearl St., Boston.

Covulc is a new discovery in rubber chemistry, based on the principle that



Before resurfacing. After resurfacing.

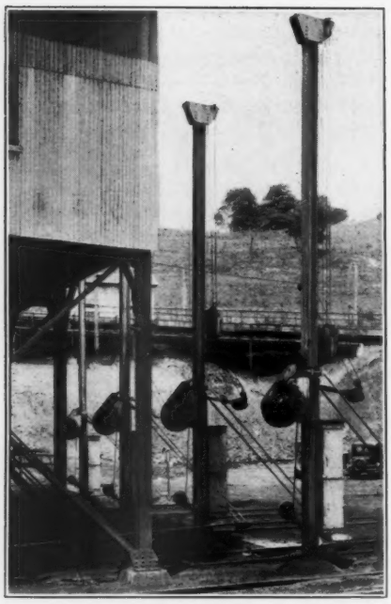
rubber is more resistant to abrasion than metal. Its manufacturers state that, therefore, equipment lined or surfaced with Covulc will give greater wear, thus reducing maintenance and purchase costs.

These claims have been substantiated by the experience of the Boston Sand and Gravel Co. and the Mystic Iron Works, two of the largest companies of their kind in the East. A chute lined with Covulc by the sand company has lasted three times as long as previous chutes made of boiler plate. Similar wear from conveyor belts resurfaced with Covulc was secured by the iron works.

Practically no special instruction or equipment is needed to apply it. Spread in paste form on metal or fabrics, it is simply rolled smooth, and vulcanizes itself in a few hours. The compound also comes in sheets on a wire mesh base for lining chutes. Joints in the sheeting may be covered with the paste, and the sheeting renewed with the paste when it begins to wear.

Railroad Car Retarder Approved Safety Device

The Fairmont railroad-car retarder is a proved practical device for handling railroad cars under storage bins. It has been used for many years for trimming cars under tipples. The cars are always under control of the operator without effort, and can be moved an inch, a foot, or a yard at a time as required, by one simple movement of the operator's hand. It eliminates the possibility of injury to the men by keeping them off the car brakes, and avoids chocking the cars when the



Car retarders at loading bins.

brakes are faulty. So strongly is the Fairmont retarder valued as an accident preventer that in some states insurance companies allow a 5 per cent discount because of its use.

In addition to the big saving of time, a saving of labor representing a return of 600 per cent per year on the investment is usually secured by reason of the fact that at least one man can be dispensed with in practically all cases.

Railroad cars will start on less grade with the retarder than with the use of the car brakes, as these frequently stick or become "frozen," and do not release properly. The retarder will easily hold one loaded car and one empty car on a 2½-per cent grade, thus necessitating the change of the cable only every other car.

The installation is simple and the cost small. It is described in bulletin 103 of the Fairmont Mining Machinery Co., Fairmont, W. Va.

Car-Pulling Unit Will Operate at Any Angle

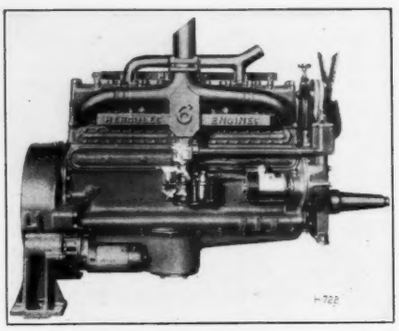
Compact, economical, and easily operated, the Weller capstan car puller was made available in an improved design during the past year.

The capstan car puller.

Regularly built in three sizes to handle from one to six 80-ton cars, this electrically operated unit is self-contained, weatherproof, and designed to pull cars or trucks, at any angle. Bulletin No. 1128-RQ contains a complete description and will be sent upon request to the Webster and Weller Mfg. Co., Chicago.

To Display Engines at Road-Builders Exhibit

Following its usual custom the Hercules Motors Corp., of Canton, O., manufacturers of heavy-duty engines, is showing an extensive and representative group of models at the Road Show in St. Louis. Among the models shown are four-cylinder and six-cylinder engines and power units. These engines cover a wide range of size.



Six-cylinder engine from manifold side.

Of particular interest in the Hercules exhibit is the Model HXC six-cylinder industrial power unit shown as a complete open-type power unit including radiator, all accessories, and clutch power takeoff. Another interesting model is the Hercules HXD, which is typical of the larger series of heavy-duty six-cylinder engines. This model is shown with leg-type bell-housing and center outlet exhaust, but it can, of course, be arranged to meet any individual specifications.

Important Developments Made in Grinding Field

Two outstanding developments have been made in the plants of the Traylor Engineering & Mfg. Co., Allentown, Pa., during the year 1930.

One of these is a grinding-classifying system for the grinding of cement both in the raw and finishing departments. The company is not at this time prepared to go into details regarding this new system; however, it is said to enable the operator to attain three important objects—namely, large capacity, great saving in horsepower per barrel of cement ground and complete and absolute control of both capacity and fineness of product. Sometime during the coming year the company will be prepared to present full details to PIT AND QUARRY readers.

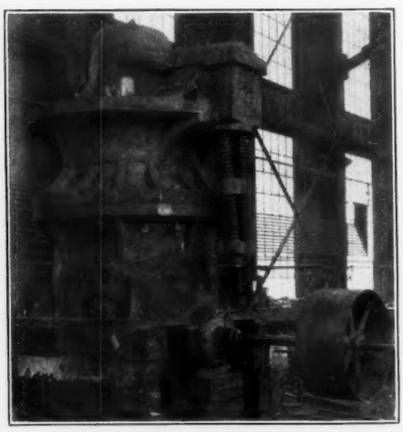
The other development is a new reduction crusher styled the Type TZ finishing gyratory crusher. The accompanying photograph gives a good idea of its sturdy design, but unfortunately the photograph does not show the inner construction.

Both the head and concaves are curved instead of the conventional straight up-and-down lines of the ordinary gyratory crusher. This design was used to secure small discharge opening and at the same time a large feed opening, with the result that a much greater ratio of reduction is attained than has hitherto been possible in a gyratory type breaker.

Choking from any cause is minimized and jamming of foreign objects between head and concaves is eliminated by the springs on the outside which allow the head to be forced downward, releasing such objectionable material.

A dual goal has been reached with this machine—namely, enormous capacity and fine product. "We hesitate at this time to say just how greatly capacities have been increased, because while we have had several of these machines in operation for the better part of a year, we have not yet been able to probe the possibilities of the breaker, and will reserve statements regarding capacity until we have a greater array of definite figures," declares G. B. Livingood, a Traylor official.

"One thing we will say, however, is that, in some cases, capacities have been doubled so that the results secured have far exceeded our expectations and all of the customers using the machine are highly enthusiastic."

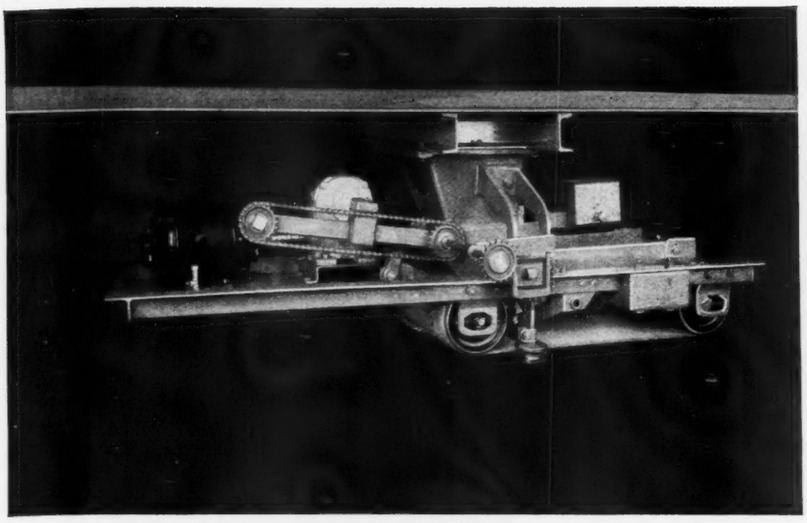


The 15-in. bulldog gyratory crusher.

One of the important features connected with this design is that the type of head and concaves used may be installed in any existing gyratory crusher, whether of the standard type or the reduction type. In fact, several of our installations of the new design have comprised the refitting of breakers of other makes than Traylor.

Tubular Conveyor, Dryer and Feeder Developments

Since its introduction a year ago, the Hardinge constant-weight feeder has been undergoing a continuous development. It is now possible to supply a



Constant-weight belt feeder.

constant-weight feeder, equipped with a remote-control device, which permits the operator to change the rate of feed from a distance.

A no-load, cut-off attachment will instantly stop the feeder and signal the operator if feed to any one unit is held up. This is especially valuable where two or more feeders are coupled together for use in proportioning feed. These feeders may be so adjusted that each unit will measure and feed accurate quantities within a wide range of capacities. Feeders may be equipped with dustproof housings, and with dustproof or explosion-proof motors.

The Hardinge Co. recently secured exclusive rights to manufacture and sell a rotary tubular conveyor invented by F. C. Jacoby. This was designed and developed to convey hot or abrasive materials over long distances with a minimum of repairs and dust losses. It has been in continuous operation for eight years in two plants handling hot, abrasive, dusty materials.

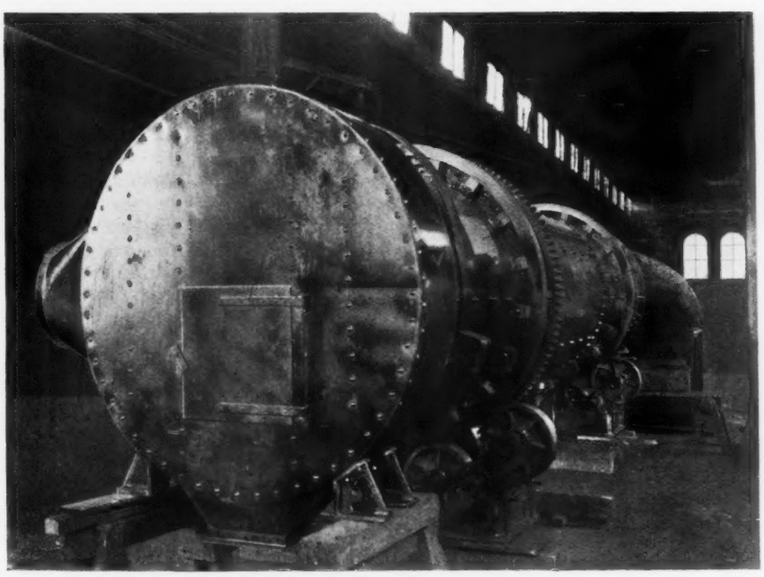
The conveyor is a screw flight, cast integral with the casing. There are no internal bearings, and the entire casing revolves on rollers. With no relative motion between the screw flight and the casing, there is practically no wear on the casing, even when extremely hot or abrasive materials are being handled.

The method of feeding prevents clogging, and allows the feed to enter the conveyor at any convenient point, and at any number of points along its length.

The product may be discharged at one or more points in any desired quantity.

A new Ruggles-Coles dryer has been developed to handle sticky clays and similar materials which have a tendency to ball up or pack in other types of rotary dryers.

This dryer has a specially-designed feed head to facilitate introducing sticky wet material into the dryer and to prevent the flame from impinging against the shell. A special arrangement of flights and baffles agitates the material as it passes through the drying area. The material will not stick to the shell, and will not ball up as it passes through the dryer. There is very little dust loss. A high thermal efficiency has been obtained and maintenance costs have been reduced to a very low point.

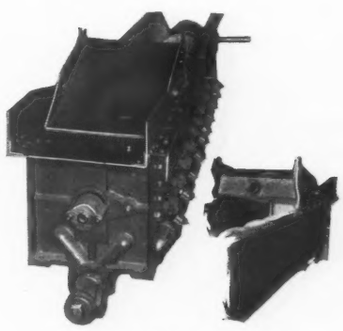


New rotary-dryer development.

While no fundamental changes have been made in the other types of Ruggles-Coles dryers, certain specific mechanical improvements have been incorporated in the design of the Class A, B and F dryers, and they are now designated as Class XA, XB and XF dryers to distinguish the new models from the old ones previously built. These improvements are all of a mechanical nature, tending toward greater efficiency, mechanical strength and economy in operation.

Improvements in Design of Sand, Gravel Washers

During the past year the Eagle Iron Works, Des Moines, Ia., further improved the Eagle gravel and sand washers by increasing the size of tub and diameter of screw in the single-screw machines. For large capacity requirements the company now builds double-screw washers, both in the gravel- and sand-washing types. Capacities have been increased materially in the single-screw machines by the enlarged tub, while twice the capacity of the single is obtained in the double-screw washers with quite an economy in space required for installation as compared to a battery of single-screw machines.



Attachment for gravel washer.

On all washers special semi-steel chilled screws are used, made of unit castings, replaceable individually. These are mounted on a three-inch square shaft which turns in Timken roller and Goodrich cutless-rubber bearings. By actual test the rubber bearings have given four to six times the wear of an all-metal packing-gland bearing.

To remove objectionable shale from gravel, Eagle Iron Works has perfected an attachment for its gravel washer. This consists of a double-bottomed chute for feeding the aggregate into the washer which provides a water force that hits the material just as it drops into the washer. This water

force kicks over the discharge the shale which the upward current of wash water tends to hold in suspension on account of its slightly lighter-than-gravel specific gravity. The principle involved is that of skipping flat stones on water, as shale is usually encountered in flat pieces. The Eagle gravel washer needs the added impetus of the water current of the shale remover successfully to remove shale.

Feeder Scale Registers Tonnage Rate per Hour

The Telepoise conveyor scale now has a companion, a feeder scale, which takes the family name, Telepoise, for it will weigh the material passing over a short conveyor, and telegraph the weight to a register located at any distance away from the scale. The register is of the continuous type, arranged to operate a twenty-four-hour, time-chart recorder which furnishes a filing record of daily operation. Like the conveyor scale, it also indicates the ton rate per hour. It is manufactured by John Chatillon & Sons, New York.

The electrical-integrating mechanism, which is the same as employed on the well-known conveyor scale, has withstood the severest tests in practical use.

The machine consists of a rigid frame with a set of weighing levers (inverted type) from which is suspended a conveyor belt, provided with a rotating-disk feeder, positive in operation, adjustable to the amount of feed required and will vary from this amount only by change of speed of rotation, which is effected automatically.

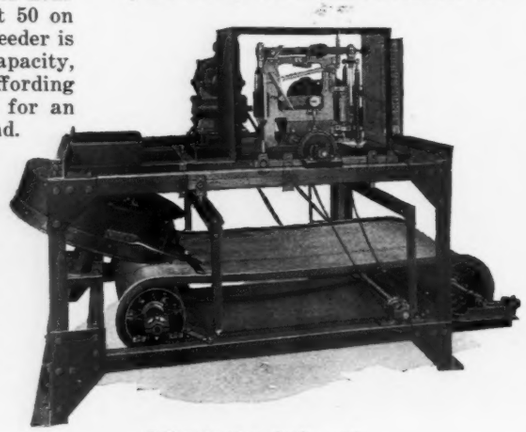
A two-speed motor directly connected to a speed reducer, mounted upon the rigid frame, provides the power to drive the belt and disk feeder and the automatic feature is obtained by varying the speed of the motor—or stopping it.

The load-indicating feature of the Telepoise is one of its outstanding points. It shows exactly the percentage of load on the scale; if the scale is calibrated for twenty tons per hour and the indicator line rests at 50 on the graduated scale, then the feeder is delivering 50 per cent of its capacity, or ten tons per hour, thus affording the operator a reliable guide for an adjustment to meet the demand.

Structurally the Telepoise is as near perfect as can be, motor and speed reducer being ball-bearing mounted as well as all other rotating parts. The conveyor belt is made with a ⅛-in. top cover and side flanges of pure rubber; the flanges are provided to prevent dribbling off the sides of the belt.

The register and recorder may be located at any distance from the scale, on the instrument board, or in the office. The controller is housed in a dust-tight casing and requires no oiling or grease. Current for its operation is usually taken from the lighting circuit; six and twenty-four volts are used and a transformer is furnished to step the lighting current down to the requirement. Calibration at the factory is final and permanent; only necessary to adjust for balance occasionally.

While the scale was originally developed to control and weigh the coal used in power houses, it has found a wide field of application and may be used where there is not room for a conveyor scale of long length, for mixing materials of different kinds or weighing material hoisted by skips into the bins.



Self-registering feeder scale.

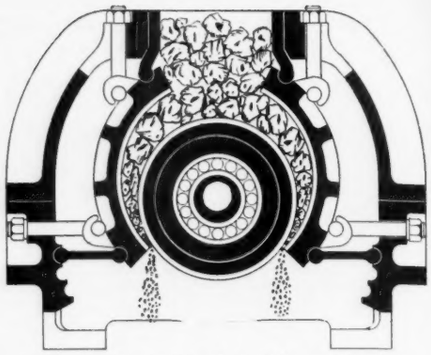
Oscillating Roll Used in Light, Compact Crusher

The Ohio crusher, manufactured by the James H. Beans Foundry Co. of Martins Ferry, O., consists of a heavy cast-steel frame to which two curved manganese steel crushing plates are rigidly attached. The curved plates are adjustable in order that crushed material of the desired size may be obtainable.

Between these curved plates, an alloy-steel eccentric shaft revolves in a steel cylinder, which floats on roller bearings and, at each revolution of the shaft, oscillates between the curved plates, an action which crushes material fed to the machine. The cylinder does not revolve, and is equipped with replaceable manganese wearing plates.

Raw material enters the machine through an opening in the top which is directly over the oscillating cylinder. It then flows downward on both sides of the cylinder and is crushed between the cylinder and the curved crushing plates, leaving the machine through an opening directly beneath the cylinder.

The Ohio has but one moving part; is without gears, oil pumps or babbitted bearings and, as the crushing is by true compression, which reduces the



Crusher with eccentric shaft within steel crushing cylinder.

wear on the crushing surfaces, lower maintenance cost will result. The Ohio requires very low head-room and, due to the absence of a multiplicity of parts, is lighter and less bulky than most types. The lower weight is particularly valuable in portable outfits where the weight of the vehicle is limited by law when transportation over the highways and bridges is necessary.

New Air Compressor to Be on Display at Show

Ingersoll-Rand Co., New York, will exhibit the following equipment at the 1931 Road Show in St. Louis, January

Portable air compressor.

10 to 16: An X-71 drifter-type rock drill on Type D wagon mounting; Type 20 portable compressors; cross-sectional assembly of the free air unloader used on Type 20 portable compressors; Type 30 air-cooled portable compressor of 30 cu. ft. per min. displacement; No. 50 drill-steel sharpener; complete display of Jackhamers, paving breakers, and pile drivers; complete line of pneumatic tools applicable to road and bridge work.

The Type 30 portable compressor is being shown for the first time. It will operate one or two pneumatic tools and is designed to furnish air for such services as grinding, chipping, scaling, concrete surfacing, paint spraying and the like. It consists of a 2-stage, air-cooled, ball-bearing compressor driven through a V-belt from a Fuller-Johnson 4-cyl, 4-cycle, ball-bearing gasoline engine. It is equipped with air cleaners, automatic unloader and governor, air receiver, and a 12-gal. gasoline tank which will hold enough fuel for a day's continuous operation.

New Speed Reducer and Motor Built as a Unit

The cry for compact drives and variable speeds has been the urge behind the new self-contained drive developed late this year by Stephens-Adamson Mfg. Co., of Aurora, Ill. This new unit is a variable-speed drive, complete in every sense of the word, consisting of a variable-speed reducer, an electric motor and a control entirely contained in one housing.

For several years Stephens-Adamson has manufactured the JFS planetary type of variable-speed transmission. This machine is a totally-enclosed unit combining the action of both speed changer and speed reducer. It is driven by the usual electric motor and, while it is compact and easily mounted, it requires, like other types, a flexible coupling between transmission and motor and both are preferably mounted upon a cast-iron or structural-steel base to insure alignment.

The new self-contained drive consists of a standard JFS variable-speed reducer mechanism with the housing redesigned to take the body of an electric motor of standard make. The motor armature shaft is extended and forms the high-speed shaft of the speed changer. In this way the usual flexible coupling and base plate are eliminated and approximately twenty-five per cent of the total length and weight are saved.

The hand wheel normally used to increase and decrease the output speed of the standard JFS transmission has been replaced by a bevel gear. This is turned in either direction by means of a bevel pinion inside the housing and the small hand wheel mounted on top of the unit as shown in the illustration.

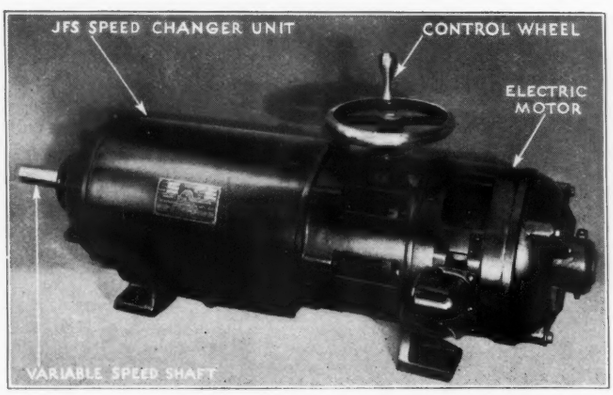
The operation of the speed changer section of the new drive is simple and positive. Fundamentally it resembles the action of a large roller bearing in which the races and rollers are ground to special shapes. The power is transmitted by the traction between the polished steel surfaces of rollers and races.

The motor shaft rotates two inner races. These races contact with three double conical rollers and cause them to rotate slowly in planetary fashion inside the two outer races which are held from rotating. The three planetary rollers drive a spider keyed to the variable speed shaft.

Power can be obtained at an infinite number of speeds by turning the hand wheel, which moves the two outer races nearer or farther apart on the longitudinal axis. As the two outer races approach each other the three rollers are forced nearer the center and in turn force the two inner races apart against heavy springs which maintain the necessary tractive pressure between surfaces.

In this way the reduction ratio can be varied to deliver the power at any speed within the limits of the machine. Where it is desirable to limit the range, stops are placed to limit travel of the races. The mechanism is entirely enclosed and, operating in oil, it requires no lubrication beyond maintaining the proper oil level.

The manufacturer states that, in addition to the standard JFS transmission (transmission only), the new complete-drive unit is to be made in sizes to deliver from ¼ to 7.5 hp., and that, with a 1,200-r.p.m. drive motor, a variable speed range of from 120 to 720 r.p.m. or 24 to 144 r.p.m. is practicable.



Variable-speed drive unit.

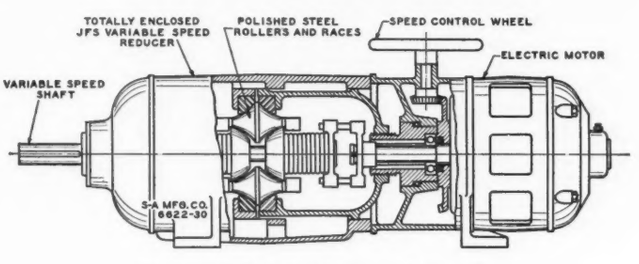


Diagram of the inclosed motor-reducer unit.

Shows Working Models at St. Louis Gatherings

The McLanahan & Stone Corp. of Hollidaysburg, Pa., will have exhibits on display at the National Crushed Stone convention at St. Louis, on January 19, 20 and 21, and at the National Sand and Gravel convention on January 26, 27, and 28. In the McLanahan space will be working models of two of the newest contributions in mechanical perfection for crushing and washing sand, gravel, stone and other mineral products. These working models will be of the new McLanahan sledge-wedge crusher, including a number of patented features which add a great deal to the efficiency of the well known McLanahan crusher.

In addition to the working model of the sledge-wedge crusher, there will be a working model of the newest McLanahan contribution to the cleaning problems of the sand, gravel, and crushed-stone industries—the new McLanahan patented demountable propeller steel log washer for removing silt, loam, soft rock, grit and the tough clays from sand, gravel, limestone and ores. One of the features of the new log washer is the "demountable propeller," a log-washer blade made to fit into a slot and tapered base on the steel log itself. These tips can be renewed or replaced in a fraction of the time formerly required for replacing blades in the older types of log washers, and at a fraction of the former cost.

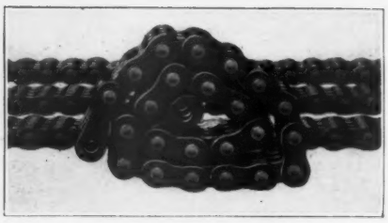
Manganese Steel Chain for Buckets Introduced

A new type of chain for use with bucket-elevator installations in central concrete-mixing plants, ash-handling plants, and for similar purposes has been brought out during the year by the Manganese Steel Forge Co., Philadelphia, Pa.

This type of chain is designed to afford continuous service and much longer life, together with lower maintenance and fewer replacements, than is given by ordinary chain. It consists of manganese-steel rollers, rolled manganese-steel side links, forged and smooth-swaged manganese-steel pins, and soft steel angles, the latter forming K-2 attachments to which the buckets are fastened.

The pins are swaged to close tolerances while they are in the cold state, a process which gives a smooth surface hardness with exceptional wear-resisting qualities. Each pin has a shoulder and is flattened at both ends so that, when the pins are fitted into the holes in the angle-irons, they are prevented from turning. Riveting is used to secure the pins to the angle-irons, thus providing a very substantial construction. This construction also maintains the alignment of the rollers and links, and insures accuracy of pitch; in fact, it makes a chain that is carefully articulated and remains that way even though the parts are subjected to excessive wear through contact with abrasive materials.

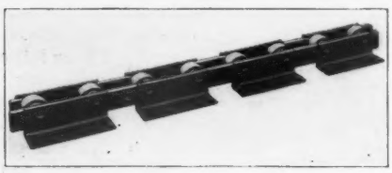
The section of chain illustrated forms part of a 10-ft. length, twelve of these lengths being connected together by threaded manganese-steel bolts. The size of rollers, spacing between



Manganese-steel chain for clamshell and orange-peel buckets.

them, and other dimensions can be made to individual specifications.

To provide longer life of opening and closing chains for clamshell and orange-peel buckets, this company also has developed a new type made entire-



Section of elevator chain with manganese-steel rollers.

ly of rolled and forged manganese steel. This steel is claimed to possess 2½ times the toughness and strength of commercial carbon steel and to have 10 times the resistance to abrasive wear.

A number of these chains have been placed in service, and have succeeded in greatly reducing maintenance costs. They can be furnished as replacements on existing buckets or can be made according to specifications for application to new equipment.

New Conditioner Bodies for Carrying Concrete

A new and improved type of the well-known Clinton conveyor-conditioner for hauling ready-mixed concrete, was announced late this month by the Clinton Motors Corp., of Reading, Pa. It is known as Type 2.

In the Clinton conditioning process, the concrete is sealed in a cylindrical tank having no internal blades or paddles, and the tank is rotated while in transit. An air space at the top causes the plastic mass constantly to flow toward the low side as the tank turns, and this "rolling-over" action brings all parts of the mass in succession to the top. Thus the air bubbles churned in by the mixer blades are allowed to escape, resulting in a dense concrete of high strength for the proportions used.

Unloading concrete from the special truck body.

In the new Type 2, the trunnion bearing formerly used at the rear of the tank is omitted, and the rear is supported by rollers bearing against a steel rim welded to the tank. This change permits the discharge door to be considerably enlarged.

With the enlarged door, even a stiff mixture is discharged rapidly. The makers say that the new-type conveyor will discharge concrete mixtures of any slump. Because of the constant rotation of the tank, the contents do not stick to the sides, but dump clean.

Exhibits Portable Plant in Arena at Road Show

The Butler Bin Co., of Waukesha, Wis., will display its latest type of portable bin, equipped with a new and improved weighing hopper in the arena at the road show.

There will also be shown a road contractor's portable bulk-cement handling plant, the balance of the exhibit consisting of a motion picture taken in the field, and several small models of aggregate-proportioning equipment. A considerable portion of the exhibit will be devoted to central-mixing plants. The exhibit will be in charge of M. R. Butler, A. R. Morton, C. E. Riblet, and M. Kelley.

Water Softeners Needed in Plants Using Boilers

As a rule the water found in and about quarries is quite hard and needs softening before it can be used in the boiler. This hardness is due primarily to dissolved limestone and other salts predominant in the district in which the quarry is located. In many places where the water which is used for the boilers is pumped from the bottom of the quarry, difficulty is experienced with flint-like scale. Some of the quarries overcome this hardness by installing a water-softening plant in which the hardening salts are either removed by the lime and soda-ash water softener, or by the exchange type of water softener. Where the zeolite, or exchange, type of water softener is used, zero hardness is obtained; but the scale-forming solids are converted to the equivalent sodium compound with the result that the total solids are just as high as in the hard water and foaming and priming is experienced.

Some quarries, among them those of the Bedford Stone Co., use the zeolite type of water softener with complete satisfaction. Others have adopted the lime-soda process for the removing of hardening salts. In this process milk-of-lime and soda-ash solution are mixed with raw water and the combination, after being thoroughly mixed, is allowed to settle and precipitate and the resulting soft water is filtered and used for boilers of the stationary type and also piped into the quarry so that the locomotives and cranes may also use soft water in their boilers.

The success of any lime-and-soda type of water softener depends upon the accuracy of the proportioning equipment. In other words, the chemical control shall be such that the amount of chemicals fed to the water as it passes into the softener shall be accurately proportioned to the flow of water to the softener. Many devices have been used for this purpose but most of them have their drawbacks. Orifices, weirs and many other types of chemical control have been used heretofore, but each of them has had its fault. It was to overcome the inaccuracies of the usual type of control that the Graver Tank & Mfg. Corp. brought out a new device which has overcome all of the difficulties with previous methods of control and is now conceded to be the most accurate chemical proportioner on the market today.

The Graver chemical control is built around a commercial water meter which is installed on the inlet line of the softener. Disk, turbine, or propeller-type meters are used as required by the capacity of the softener. A Graver speed-reduction gear is attached and geared to the main shaft of the meter, which otherwise is unchanged. The gears of this reducer are cut from tool steel and the housing is made of cast bronze. The main shaft of the speed reducer is fitted with an aluminum drum. A lightweight cable is attached to and wound on this drum, its free end fastened to the free end of the swing pipe in the chemical tank. As the water enters the softener for treatment, the meter revolves, turns the cable drum, unwinds the cable and lowers the swing pipe into the chemical tank, thus providing for a chemical feed of correct proportion to the amount of water to be treated. It can readily be seen that when the water stops flowing the meter also stops and, hence, there is no solution being supplied. Immediately the water begins passing through this meter, motion is set up and the apparatus begins to proportion accurately to the amount of water passing through the meter. As the flow varies the chemical solution fed to the softener varies as well, and in direct proportions. The device is just as accurate as the meter to which it is attached and because the speed reduction is somewhere in the neighborhood of 100,000 to 1, there is no noticeable interference with the accuracy of the meter.

Manufacturers' Publications

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Cars, Automatic

Sanford-Day Mine Cars. 4 p., 3 ill. (Sanford-Day Iron Works, Inc., Knoxville, Tenn.) Describes and illustrates automatic rock and ore cars for quarries and mines. Cites cost figures submitted by four producers.

Compressors

Compressors and Vacuum Pumps. 12 p., 15 ill. (Bulletin C-2. Fuller Co., Catasauqua, Pa.) Describes and illustrates a series of compressors and vacuum pumps for capacities up to 1,460 cu. ft. per min. actual delivery and discharge pressures up to 140 lb. gauge.

Controllers, Hoist

Control . . . the Vital 5%. 4 p., 10 ill. (The Electric Controller & Mfg. Co., Cleveland, O.) Describes and illustrates the application of hoist controls to ore bridges.

Drilling

Loomis Clipper Blast Hole Drills. 56 p. Illustrated. (The Loomis Machine Co., Tiffin, O.) Describes and illustrates blast-hole drilling equipment. Action views of the machine are shown.

Excavators

The 52B Diesel. 16 p., 18 ill. (Bucyrus-Erie Co., South Milwaukee, Wis.) Describes and illustrates the new Diesel shovel-dragline-clamshell-crane made by the company. Features of the excavator include improved steering, oversize mountings and slow-speed 6-cylinder engine.

Inspection Service

The Protective Value of Independent Inspections. 8 p., 8 ill. (Pittsburgh Testing Laboratory, Pittsburgh, Pa.) Describes and illustrates the building and material inspection services available through this concern, pointing out the value of its independent tests.

Lubricants

Stuart Oils. 62 p. Illustrated. (D. A. Stuart & Co., Chicago, Ill.) Describes and illustrates a wide variety of oils for every industrial need. Special lubricants made to order for special problems.

Machinery, Used

Zelnicker's Bulletin. No. 415. 16 p. (Walter A. Zelnicker Supply Co., St. Louis, Mo.) Lists Diesel engines and Diesel generating plants, some new and others rebuilt. Also includes list of other power equipment.

Good Used Machinery. 4 p., 11 ill. (Bulletin No. 11. Consolidated Products Co., Inc., New York, N. Y.) A new bulletin listing a wide variety of crushing, pulverizing, filtering and drying equipment for use in non-metallic mineral plants. Practically any size or brand available.

Manganese Steel

"Manganese Steel Sheaves Save the Rope." 1 p., 6 ill. (*The Amsco Bulletin* for November 1, 1930. American Manganese Steel Co., Chicago Heights, Ill.) Describes the experience of a Texas sand-and-gravel company which solved its heavy wire-rope replacement costs by adopting manganese steel sheaves.

Mixers

Turbo Equipment. 12 p., 14 ill. (Turbo-Mixer Corp., New York, N. Y.) Describes and illustrates a new idea in the practice of mixing and agitating materials. Includes a list of large manufacturers who are using the equipment.

Motors, Induction

Unit Type Ideal Induction Motors. 8 p., 11 ill. (Bulletin 200. The Ideal Electric & Mfg. Co., Mansfield, O.) Describes and illustrates a new type of induction motor available with standardized rotors and stators and other interchangeable units.

Plant Equipment

Telsmith Mining, Quarry and Gravel Pit Machinery. 28 p. Illustrated. (Bulletin 266G. Smith Engineering Works, Milwaukee, Wis.) A comprehensive catalogue of machinery including crushers, screens, washers, elevators and loading chutes.

Pulverizer

Raymond Kiln-Mill. 4 p., 3 ill. (The Raymond Bros. Impact Pulverizer Co., Chicago, Ill.) Describes and illustrates the wide possibilities of this machine which dries and pulverizes materials in a single operation.

Welding

Tobin Bronze and Other Anaconda Welding Rods. 12 p., 26 ill. (The American Brass Co., Waterbury, Conn.) Describes and illustrates rods for bronze welding and electrodes for arc welding. Includes a temperature color chart.

"Oxwelding in Plant Maintenance." 6 p., 10 ill. (*Oxy-Acetylene Tips* for December, 1930. Oxweld - Acetylene Co., New York, N. Y.) A comprehensive article which points out why a central welding department is vital to plant operating in industry.

Hercules Powder Had No Accidents in November

An unusual safety record has been established by the Hercules Powder Co. during the month of November in operating all of its plants throughout the country without a lost-time injury to anyone.

This record is unique when it is considered that the Hercules company's operations comprise ten explosives and heavy chemical plants, two naval stores plants, one cellulose and one nitrocellulose plant, five woods camps, and one Experimental Station. Although individual plants have made excellent records for themselves and maintain a high safety standard, it is the first time in the history of this company that all twenty units (employing 2,805 workers) have operated the same month without a lost-time accident.

Hoist Company Acquires New Chicago Warehouse

In order to improve its service in the Chicago area the American Hoist & Derrick Co., with offices at 205 W. Wacker Drive, Chicago, has purchased warehouse facilities which will enable it to carry complete stocks of new machines and repair parts for the service of all users of American hoisting machinery.

Company to Repurchase Stock Bought in Boom

Gardner-Denver Co. will repurchase from employees at prices paid for it $180,000 of stock sold under an employees' participating plan during the 1929 bull market. The company will pay 6 per cent interest on deposits made by employees for purchase of stock. The average price of stock to employees was 58c.

Cleveland Sand Concern Located in New Offices

The Superior Sand Co. of Cleveland, O., is now located in its new offices in the Fidelity Bldg., and W. T. Findley is president and H. C. Koontz, secretary and treasurer of the concern.

New Corporations

PETRIE LIME PRODUCTS, LTD., Blubber Bay, Texada Island, B. C., Can. D. R. Petrie, president; S. W. Gebo, vice-president; L. H. Drake, secretary-treasurer. $50,000. Acquired property and equipment of Western Lime Products, Inc., of Seattle, Wash. To manufacture quicklimes, chemical limes, hydrated lime and limestone products. Offices in Seattle, Vancouver and at plant on Texada Island. Plant at Blubber Bay, Texada Island, B. C., Can.

HAT ISLAND SAND & GRAVEL CO., Everett, Wash. $50,000. L. B. Steadman and Victor Elfendahl. Plant on Gedney Island, Everett, Wash.

DENVER SAND & GRAVEL CO., 5700 Monroe St., Denver, Colo. Frank A. Perry, Manager; E. P. Mailo; S. G. Ferraro. 25,000 shares n.p.v.

MISSOURI RIVER SAND & GRAVEL CO., Booneville, Mo. Monte C. Coulter, Booneville; Stanley H. Ferguson, Tipton, Mo. $40,000.

Start the New Year Right With a Well-Planned, Impressive Safety Gathering

By W. DEAN KEEFER
Director, Industrial Safety Division, National Safety Council

YOUR January safety meeting is worthy of special planning, since it will mark the end of your old safety year and the beginning of your new safety year. It might be advertised as your Annual Safety Meeting, a summary of your safety accomplishments of the past year, and a new safety "set-up" for the year ahead.

This should be your most important safety meeting of the year. If you have been conducting inter-plant or inter-department safety contests, the safety awards naturally will be presented at this meeting.

It would be advisable to hold this meeting as early in the month as possible, following the completion of your safety summary for the past year. This will tend to capitalize, for this meeting, a part of the New Year sentiment that is in the air. All of those men who are in the habit of making New Year's resolutions should be encouraged through the influence of this meeting, to include resolutions pertaining to their own personal-safety program and to the plant-safety program.

The special feature of this annual safety meeting should be the 1930 plant-accident record. This record and a detailed interpretation of it should be presented by the one person in your plant who is most qualified, and this person should be made to feel that he has been honored through his selection as the plant-safety spokesman.

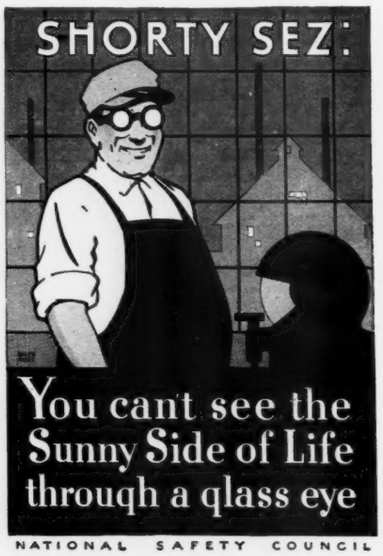
The one person best qualified will probably be your plant safety engineer or supervisor. But conditions may exist which will make it more advisable to select, as your safety spokesman, your company statistician, your general manager, your operating superintendent or some other qualified person.

The most brief and concise method for your plant-safety report is to use the form known as "A Summary Report of Industrial Accidents," devised by the National Safety Council.

This form simply calls for four tabulations of figures:

1. The average number of plant workers—possibly classified for your own use by plants, departments, and by shops or foremen.
2. The total number of hours worked.
3. Number of lost-time accidents.
4. Number of days lost.

From these figures may be calculated your plant accident-frequency and accident-severity rates. These rates, as all safety workers know, have been nationally standardized for all industries through years of education conducted by the National Safety Council in coöperation with many other organizations. Such standardized records for your plant will enable you to compare your own safety record with the safety records of thousands of other plants in the United States.



Accident-frequency rate has been defined as "the number of lost-time personal injuries per 1,000,000 man-hours worked." Accident-severity rate has been defined as "the number of days lost from accidents (including arbitrary figures for permanent disabilities and deaths) per 1,000 man-hours worked."

If your plant is able to tabulate its 1930 accident experience in accordance with this form, the summary should be mailed to the National Safety Council for tabulation in the 1931 edition of the "Industrial Accident Statistics." The last edition of this nation-wide report shows the 1929 accident experience of 3,603 industrial establishments which reported a total of more than 5.000,000,000 man-hours worked in 27 distinct industries, including the ceramic, element, non-ferrous metallurgical and quarry industries.

In this annual accident statistics report the record of each plant is confidential. It is identified by a number only, which number is known only to the authorities of the reporting plant and to one member of the staff of the National Safety Council.

The speaker for your program should compare your company record for the past year with the records for previous years. He also should compare it with the average of similar plants in your industry, as given in the annual Safety Council report.

If possible, he should compare your plant-accident costs for recent years. He should prepare, in advance, one or more charts listing all of your plant departments in descending order, showing the department with the best accident record at the top, and so on down the list. Perhaps another chart could show the recent record of each department as compared with its safety records for previous years.

The speaker might comment on outstanding features of the plant-safety report and explain what, in his opinion, should be emphasized to improve the plant-safety record for the coming year.

A general discussion should follow his remarks and the chairman should encourage all members of your safety committee and all other persons who care to do so to express their own opinions as to which activities should be stressed for lessening plant accidents for the year ahead.

An interesting surprise feature may be planned for this meeting. The chairman, in advance of the meeting, should confidentially notify the foreman whose department has achieved the best safety record for the year. At the proper time, this foreman should be introduced formally and asked to speak on one or more of the following subjects:

How our department won the record.

Why I believe in safety.

The foreman must be the safety director of his department.

Do new men need more supervision for safety than older men?

How I detect and correct accident hazards among my men.

If safety prizes are to be awarded, this topic can be made an important feature of your annual safety meeting. If prizes are not to be awarded, the foreman who has achieved the highest plant-safety honors may be encouraged, at this time, to start at least an informal inter-departmental safety contest. He may challenge all other departments to compete with his the prize to be a safety banner or some other suitable award to be contributed by the management.
department during the coming year,

If the other foremen who are present seem inclined to accept this challenge, a special committee may be selected to draft the contest rules. This committee probably can get some practical suggestions through reading Safe Practices Pamphlet No. 74 of the National Safety Council, on "Competition as an Aid in Promoting Accident Prebe supplied free upon request.